AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

Civilian and Defense

MAY 15, 1951

In This Issue . . .

Automotive Activities in Italy

Gears of Exceptional Quality

Chrysler V-8 Production Techniques

West Germany's Largest Show

Aircraft Manufacturing Developments

Complete Table of Contents, Page 3

A CHILTON PUBLICATION



winter has lost its sting



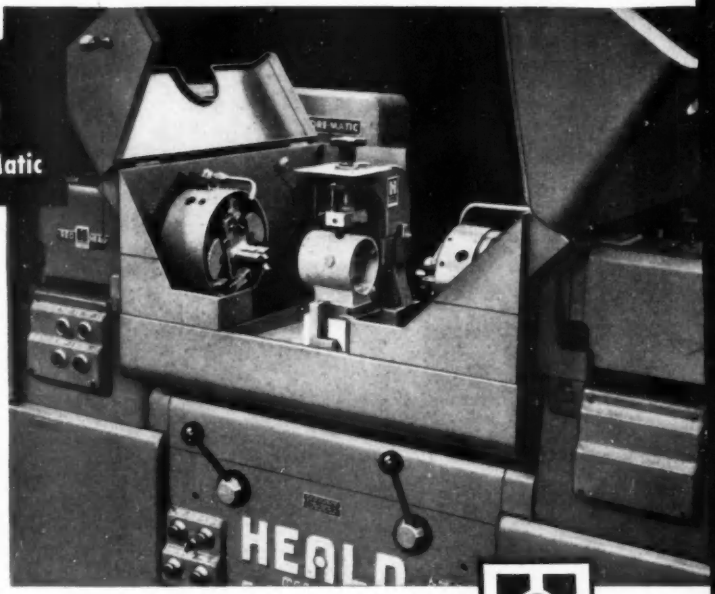
. . . thanks to the speed and precision of Heald Bore-Matics

Gone is the old wood burning parlor stove. Gone, too, are the laborious hand methods of manufacture that produced it.

Today's compact, automatic heating plants are built in quantity and at low cost — because essential parts are precision finished on Heald machines. That means *faster, better* and *easier* production, with higher precision, greater accuracy and fewer rejects. For all Heald Bore-Matics and grinding machines are designed and built with the extra care and precision that assure maximum production efficiency for you.

Remember — when it comes to precision finishing, it pays to come to Heald.

Fuel Unit Housings
FINISHED FASTER
on a new Heald Model 222 Bore-Matic



in this case HERE'S WHY

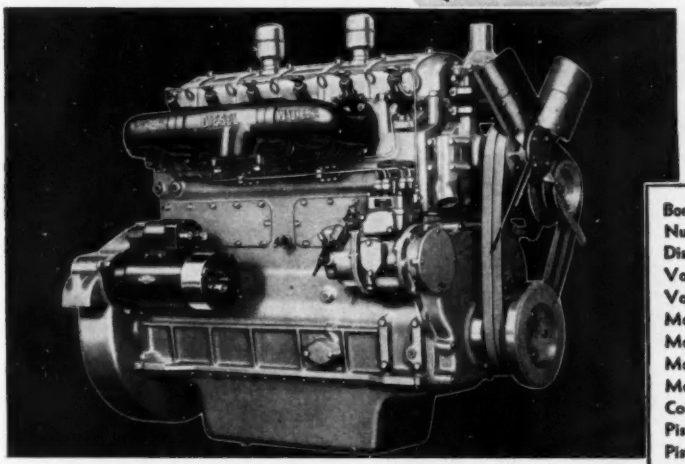
1. High rapid traverse rate — extra table speed decreases time spent between actual borizing operations.
2. High precision heads — Heald Red Heads and cross feed units meet the strictest accuracy requirements.
3. Double end setup — permits operations on both ends of the work in a single automatic cycle.

THE HEALD MACHINE COMPANY
WORCESTER 6, MASSACHUSETTS

HEALD

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

A *New* WAUKESHA Transport *Diesel* Six



MODEL 135-DKA

Bore x Stroke	4¼ x 5
Number of Cylinders	6
Displacement, cu. in.	426
Valve Diameter, clear, intake	1¾
Valve Diameter, clear, exhaust	1½
Main Brg., Front, dia. x lgth.	3¼ x 1 11/16
Main Brg., Center, dia. x lgth.	3¼ x 2⅜
Main Brgs., Inter. (4), dia. x lgth.	3¼ x 1 11/16
Main Brg., Rear, dia. x lgth.	3¼ x 2½
Conn. Rod Brg., dia. x lgth.	3 x 1⅜
Piston Pin, floating, dia. x lgth.	1½ x 3⅝
Piston Rings, Comp. (3), face width	⅛
Piston Rings, Oil Control (1), face width	1/16
Timing Gears, face width	1¼
Flywheel Housing, S.A.E. No.	3

All dimensions given in inches unless otherwise stated.

...with all these modern features, this engine is suited for high speed metropolitan and suburban delivery service as well as high speed highway transport. A full Diesel four-cycle engine, its patented spherical combustion chamber permits it to burn all modern high speed Diesel fuels from 45 cetane up.

Cylinder Head—Alloy iron casting in which are mounted removable combustion chambers, valves and valve operating mechanism. Both valve seats are Stellite inserts.

Crankcase — Deep, rigid, combination crankcase and cylinder block, sturdily braced by the seven bearing bridges and the outside longitudinal rib and struts at the base. Large openings give access to coolant jacket for inspection and removal of scale and sludge.

Cylinders—Renewable dry liners of hardened alloy iron, honed to fine finish.

Pistons—Aluminum alloy with four rings, all above the piston pin. Three compression rings, K-type; one oil control, square section. Top ring is chrome plated.

Piston Pins—Extra large, hollow, hardened and lapped finish. Full floating.

Crankshaft—Seven-bearing, drop-forged, heat-treated steel. Crankpins and main journals are hardened (500-600 Brinell), ground, and polished. For high speed (2800 rpm) and peak output operation the crankshaft is counter-weighted and fitted with torsional vibration dampner. Shafts are statically and dynamically balanced to 4/10 inch-ounces.

Connecting Rods — Rifle drilled, heat-treated drop forgings. Large bearing is steel backed copper-lead precision shell—small end has hard bronze bushing.

Main Bearings — Precision type, steel backed, copper-lead shells; heavy, ribbed caps and heat-treated bolts.

Valves and Seats—Both intake and exhaust valves are Stellite-faced alloy steel forgings operating in renewable guides. Both valve seats are Stellite inserts.

Timing Gears — Wide-faced, helical-cut timing gears are mild steel and cast iron.

Lubrication — Full pressure by gear-driven gear-type pump to main, rod, camshaft, and piston pin bearings. Metered intermittent pressure to timing gear spray, rocker arms and valve chamber. Flood oiling to cams and tappets from valve chamber spill-back; cylinders and pistons are lubricated by crankshaft throw-off. Pump has floating intake screen to insure only clean oil is drawn from the clear top layer of the oil supply.

Oil Filter—Large waste-packed oil filter bolted to the crankcase is shunt-connected; cleans oil continuously.

Cooling—Efficient belt-driven pump-and-fan, flange-mounted at the front of cylinder block provides positive circulation of coolant. Thermostat assists in fast warm-up, and maintains proper jacket temperatures.

Injection System — American Bosch flange-mounted injection pump with drawn steel injection lines to American Bosch single orifice pintle nozzles.

Fuel Feed Pump—Diaphragm-type primary pump mounted on camshaft side of crankcase is positively driven from eccentric on camshaft. Hand lever for initial filling of fuel system.

Fuel Filter—Adequate protective fuel oil filter.

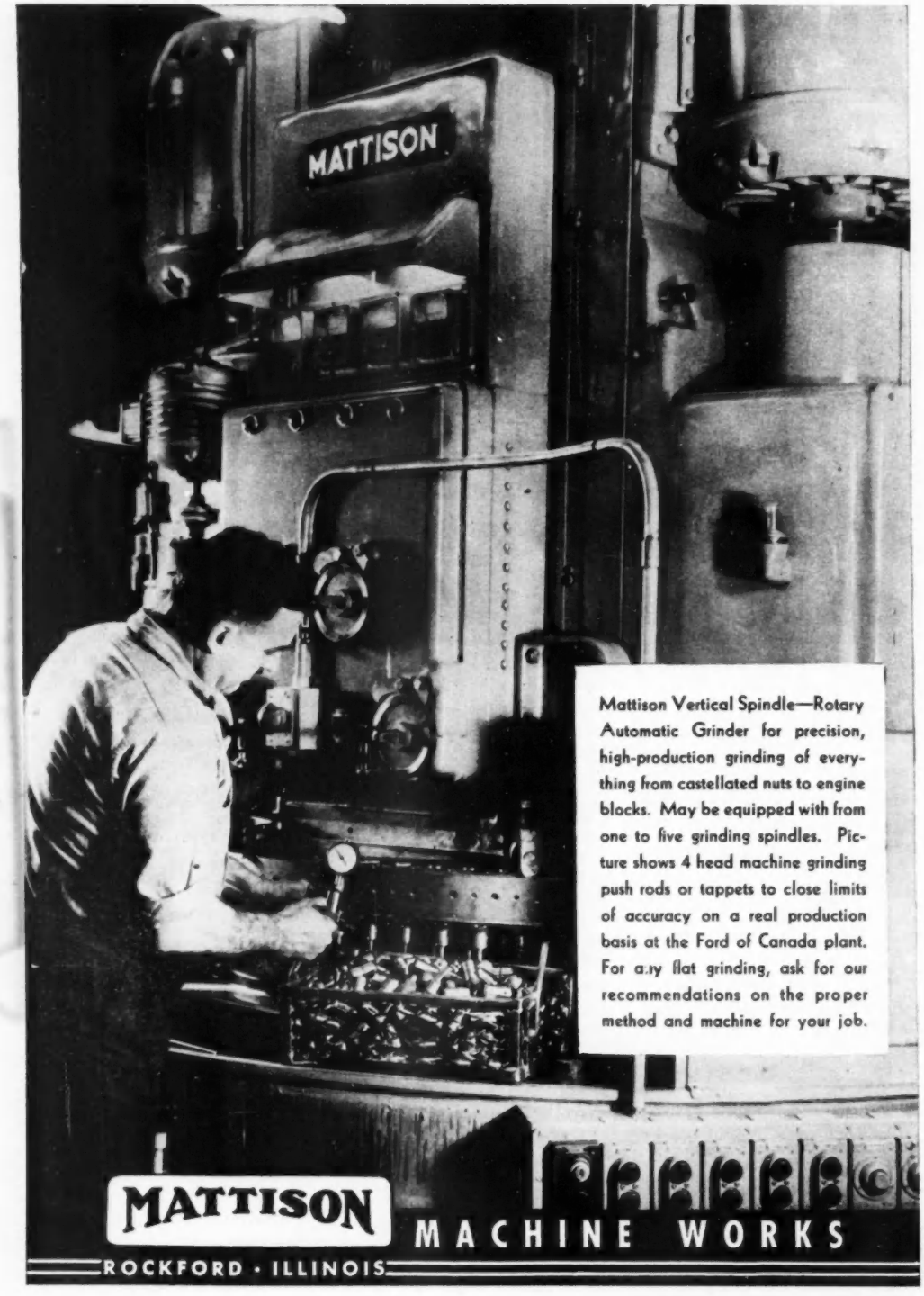
Governor — Waukesha-type centrifugal governor incorporated in fuel injection pump. It is fully enclosed, self-lubricating and non-hunting.

Starters (Extra)—Electric starting, 12-volt system with belt-driven generator, regulator and details; Chevron primer is also available as "extra" equipment.

Send for Bulletin 1573. Consult Waukesha Engineers about all your engine requirements. No obligation.

125

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. • *New York, Tulsa, Los Angeles*



Mattison Vertical Spindle—Rotary Automatic Grinder for precision, high-production grinding of everything from castellated nuts to engine blocks. May be equipped with from one to five grinding spindles. Picture shows 4 head machine grinding push rods or tappets to close limits of accuracy on a real production basis at the Ford of Canada plant. For any flat grinding, ask for our recommendations on the proper method and machine for your job.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

May 15, 1951 Vol. 104, No. 10

Contents

High Spots of This Issue	15
News of the Automotive Industries	17
Men in the News	25
Automotive Activities in Italy. By W. F. Bradley	32
Engineering Developments in Aircraft Production. By T. E. Piper	34
SAE Annual Aeronautic Meeting	39
West Germany Holds Largest Show	40
Gears of Exceptional Quality. By H. S. Gist	42
LPG Conversion System for Reo Gold Comet	45
Chrysler V-8 Pistons, Rods and Crankshafts in Production. By Joseph Geschelin	46
New Production and Plant Equipment	50
Measuring and Recording Muffler Efficiency	52
The Business Pulse	54
Dodge Brings Out Improved Military Vehicles	56
Publications Available	58
Airbriefs	60
New Products	62
New Products for Aircraft	90
Defense Facilities Approved for Fast Tax Writeoffs	94
Calendar of Coming Events	110
Advertisers' Index	198

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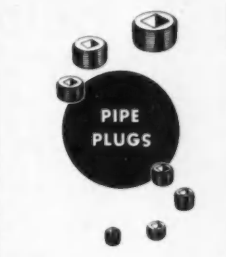
AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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LITERATURE. Comprehensive data on any or all Tourek products sent promptly upon request . . . write for yours now. J. J. TOUREK MFG. CO., 4701 W. 16th St., Chicago 50, Illinois



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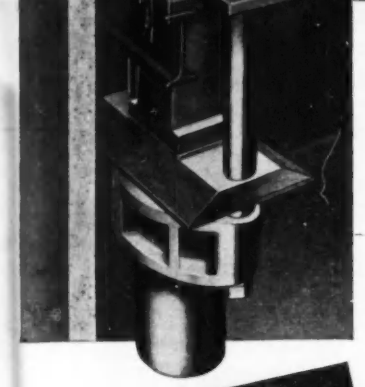
"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"



ESTABLISHED IN 1920

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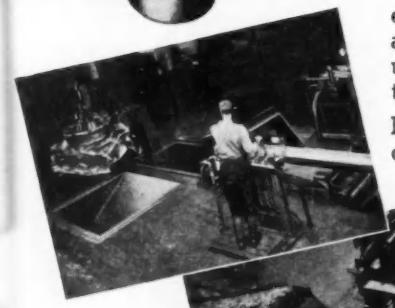


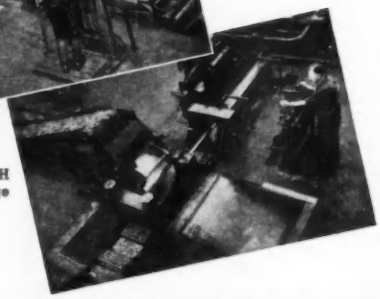


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The "heart" of your sheet-steel salvaging program is your baling equipment. It should be adequate to handle your daily accumulation of sheet steel scrap efficiently at low cost-per-ton. Then you can show a profit on your salvaging operations while contributing your share to the rapidly expanding production of new steel in the years ahead.

Large G-H Balers, properly designed and ruggedly constructed, hold to a minimum the cost-per-ton of baled sheet steel scrap. Galland-Henning engineers, with a background of many years' experience in this field, offer you competent counsel on your scrap baling operations. Consult them NOW regarding modernization or expansion of your baling facilities to meet future needs.





Typical views of G-H Baler operations in large metal-working plants.

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SCRAP METAL BALING PRESSES

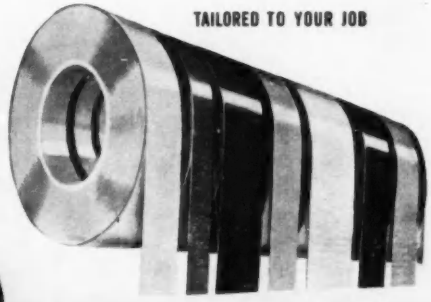
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THE NEW

Polyken®

INDUSTRIAL TAPES

TAILORED TO YOUR JOB





Back from the grave, after 2 years, comes *Polyken* Tape No. 882—as good as the day it was buried.

Buried...and alive after two years!

Bauer & Black Research Engineers coated pipe with *Polyken* Tape No. 882 (a Polyethylene corrosion protection coating). Following standard soil-box test procedure the pipe was buried in Bentonite clay which was alternately watered and left to dry out. A copper plate was placed at the bottom of the box and a constant test voltage was maintained on the pipe.

Meter readings showed *Polyken* No. 882 had an electrical resistance averaging one megohm per square foot of covered surface.

After two years of being subjected to these test conditions the pipe was removed, as illustrated above.

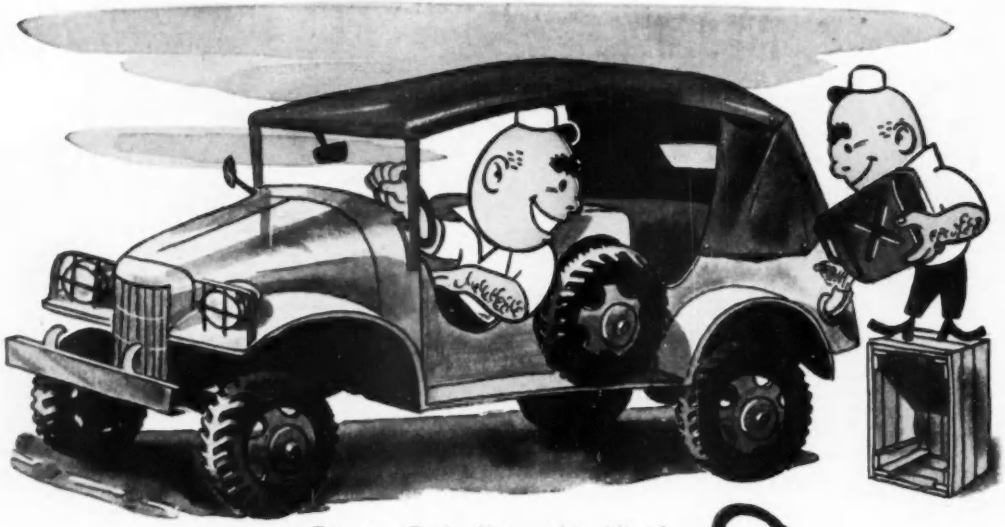
The Research Department found *Polyken* No. 882 as alive and serviceable as the day it was buried. *Polyken* No. 882 *still had* an electrical resistance that averaged one megohm per square foot of covered surface.

Further, although under the most severe type of soil stress there was no cracking, wrinkling or peeling of *Polyken* Tape No. 882.

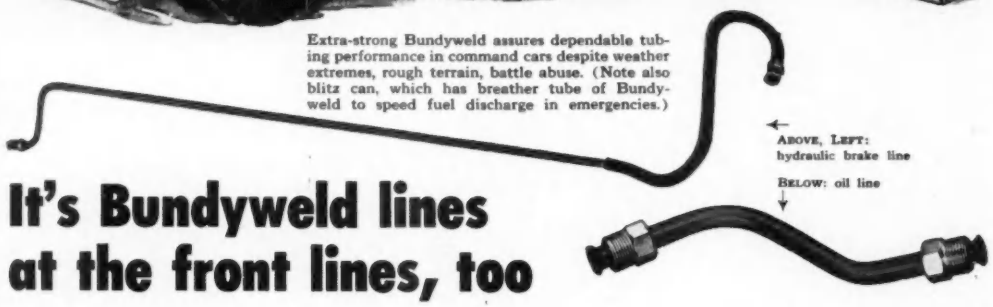
We tell you the soil-box story as an example of how tape that's "tailored to your job" can do things you never dreamed tape could do. Let us study *your* problem, and we'll come up with a tape that will save you money, time and effort. That's a challenge. Won't you take us up on it?

GET THIS FREE BOOKLET! To help you find the tape "tailored for your job," write for your free copy of "Tape is a Tool." Address *Polyken*, Dept. AIE, 222 W. Adams Street, Chicago 6, Illinois, or see your *Polyken* distributor.

Polyken Industrial Tape, Department of Bauer & Black, Division of The Kendall Company



Extra-strong Bundyweld assures dependable tubing performance in command cars despite weather extremes, rough terrain, battle abuse. (Note also blitz can, which has breather tube of Bundyweld to speed fuel discharge in emergencies.)



ABOVE, LEFT: hydraulic brake line

BELOW: oil line

It's Bundyweld lines at the front lines, too

Top automotive tubing for twenty-five years, Bundyweld performs better in vital fuel, oil, brake, and hydraulic lines of army vehicles, too. Bundyweld takes more vibration, more pressure. It withstands the shock of jolts and jars. It won't leak.

Bundyweld fabricates better, too —comes to you scale-free, held to close tolerances, smooth and clean inside and out. It machines in almost any way, bends easily to short radii without weakening.

Bundyweld is the only tubing double-walled from a single strip, with a patented beveled seam-edge. It's copper-brazed through 360° of wall contact into a safer, stronger, solid-wall tube. For more information, or for help in solving bending problems, write today. ***Bundy Tubing Company, Detroit 14, Mich***

Bundyweld Tubing®

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

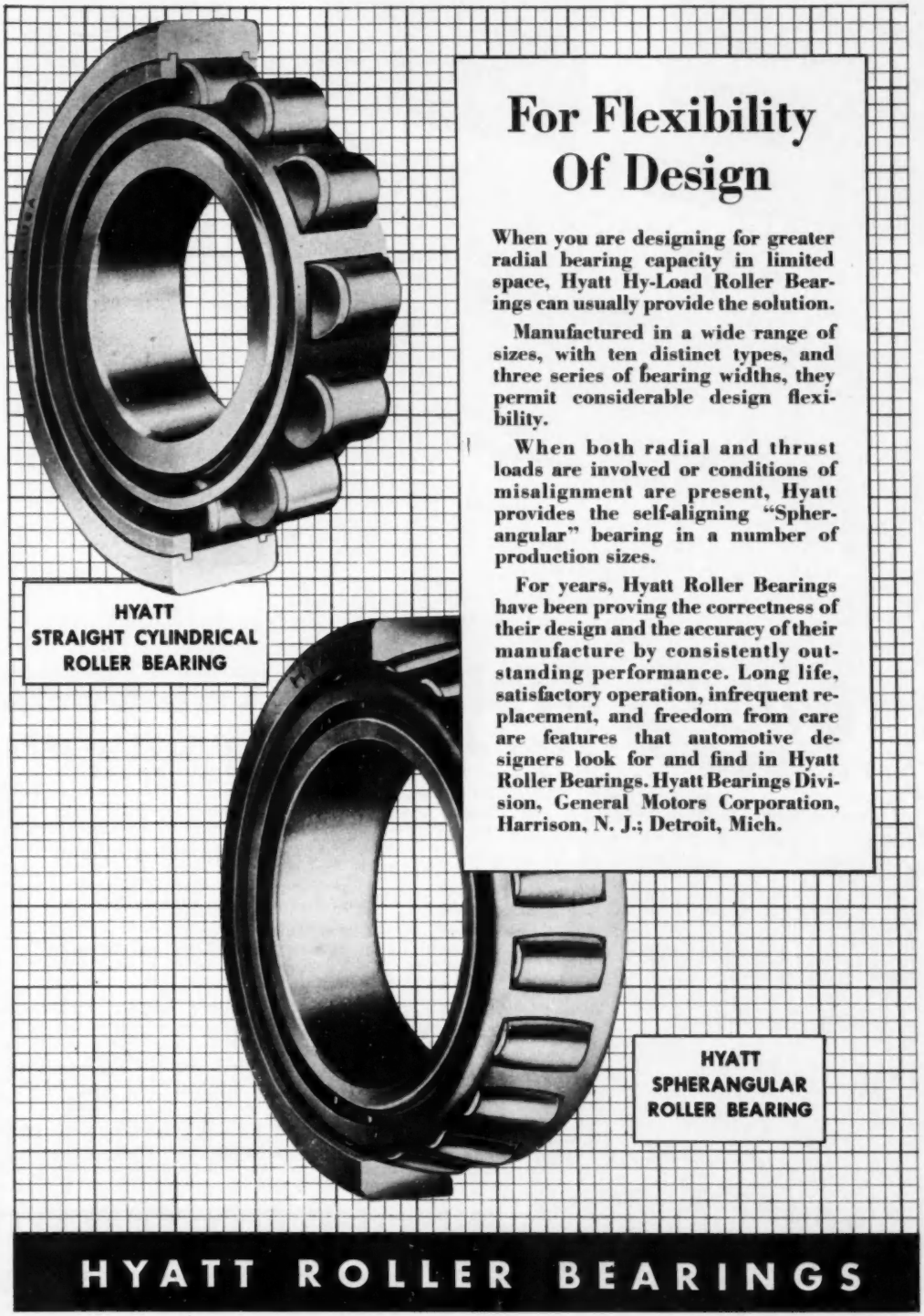
passed through a furnace. Bonding metal fuses with basic metal, presto—

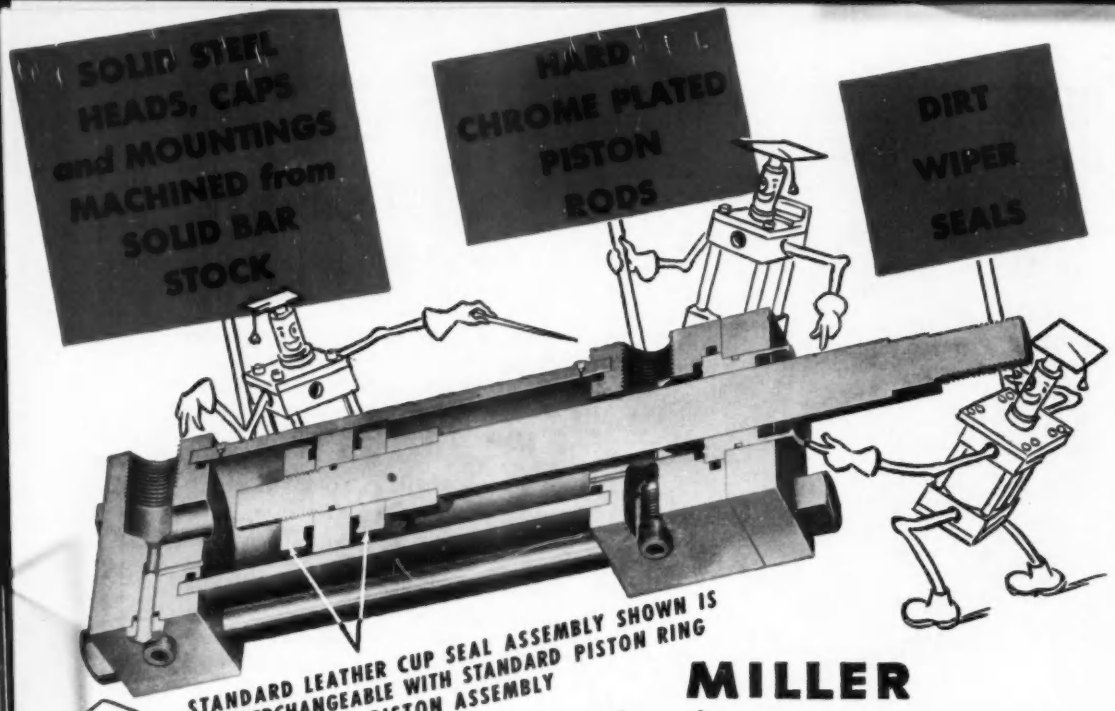
Bundyweld . . . double-walled and brazed through 360° of wall contact.



NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

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HYATT STRAIGHT CYLINDRICAL ROLLER BEARING
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High Pressure
HYDRAULIC CYLINDERS
Meet J. I. C. HYDRAULIC STANDARDS

(Write for FREE COPY of the "Standards")

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MILLER MOTOR COMPANY

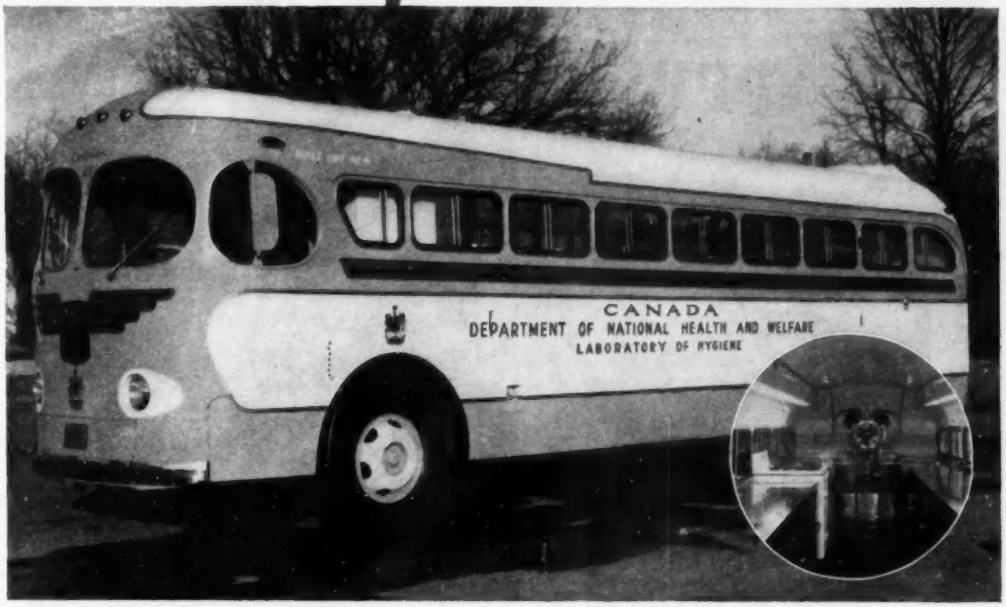
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(1) *Increased mechanical reduction* . . . (2) *More compactness* . . . (3) *Reduction in weight* . . . (4) *Greater arm angular-travel* . . . (5) *Improved metallurgy* . . . (6) *Increased efficiency.*

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Your Insurance Against Complaints

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- Reducing weight
- Excluding dust, grit, etc.
- Cushioning shock
- Filtering liquids
- Grinding and polishing gaskets, grommets, etc.
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Western Felt engineers with decades of experience in the use of felt stand ready to counsel you.

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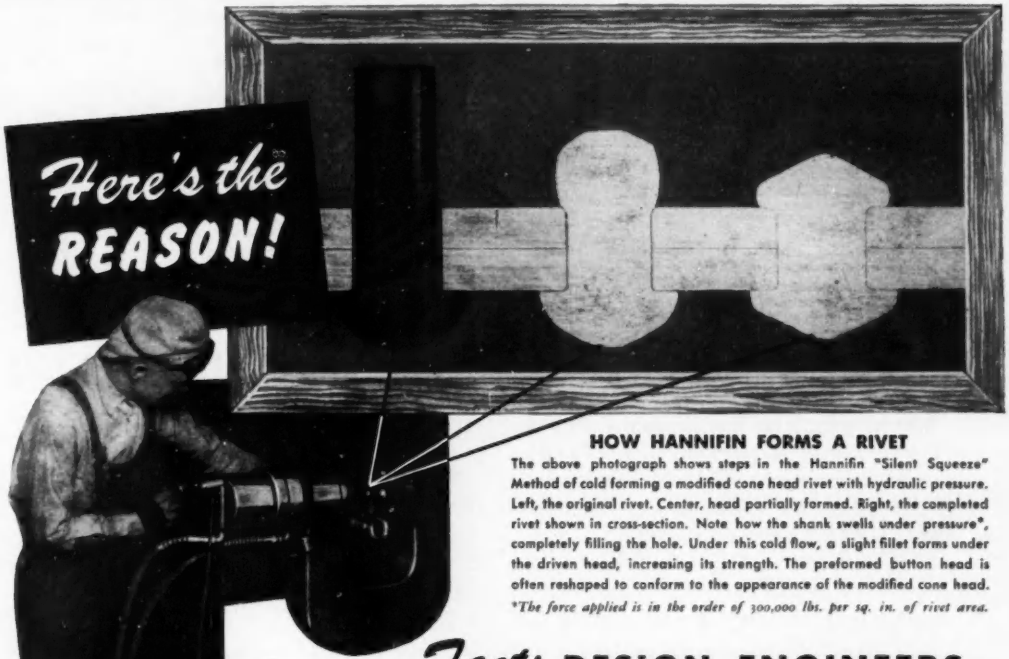
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SUPERIOR STRENGTH?



HOW HANNIFIN FORMS A RIVET

The above photograph shows steps in the Hannifin "Silent Squeeze" Method of cold forming a modified cone head rivet with hydraulic pressure. Left, the original rivet. Center, head partially formed. Right, the completed rivet shown in cross-section. Note how the shank swells under pressure*, completely filling the hole. Under this cold flow, a slight fillet forms under the driven head, increasing its strength. The preformed button head is often reshaped to conform to the appearance of the modified cone head.

**The force applied is in the order of 300,000 lbs. per sq. in. of rivet area.*

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FAST, ECONOMICAL — Large savings possible. One man operation. Total elapsed time for the operating cycle ranges from 1½ to 4 seconds, depending on size.

NO WORRY ABOUT FAULTY WORKMANSHIP — Unvarying mechanical precision. No high costs for inspection and repairing of defects. Anyone can operate.

For the complete story, ask for a copy of the Hannifin bulletin, "HY-POWER HYDRAULICS," No. 150. Find out why Hannifin riveting equipment is now used by all leading makers of automobiles and by many other manufacturers.

"On the spot" engineering service in all leading industrial centers.

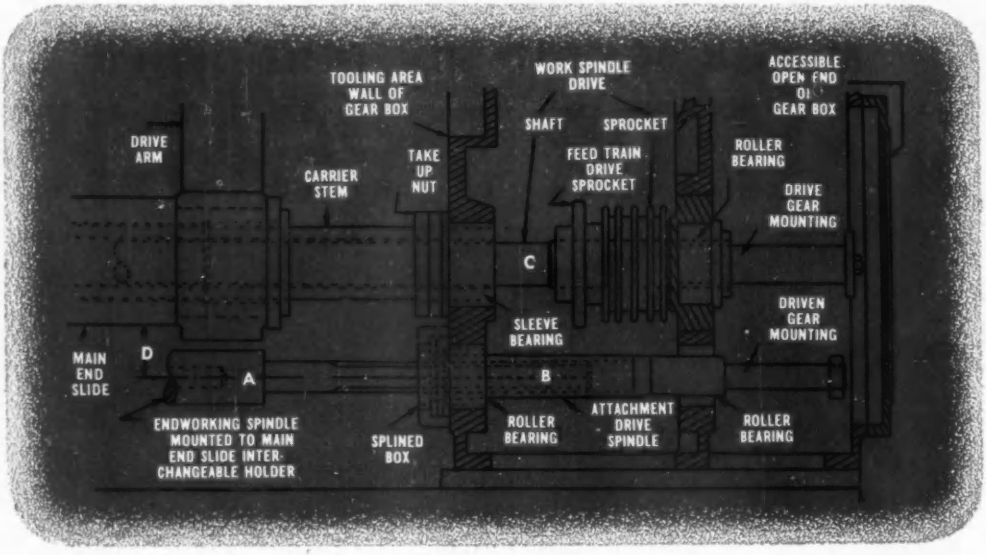
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BULLETIN 150, "HY-POWER HYDRAULICS," on Riveting, Punching, Pressing, Multiple Punching, and Multiple Riveting.

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BEWARE OF THE BAR IN BARGAIN

With manufacturing costs much the same the country over, the purchase prices of various brands of a given type of machine tool should be about equal for equal value. Healthy competition tends to level out prices.

All of the best facilities of the highest priced machine may not be needed, and should not be expected of the lowest priced machine. The value of any brand depends on how well its facilities meet the particular needs of the individual plant.

Of all required facilities, those of low-cost operation and maintenance are universally considered important. A machine without them is a BAR to any GAIN at any PRICE.

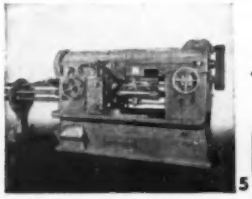
An example of **LOW-COST OPERATION AND MAINTENANCE FACILITY** is the **EXCLUSIVE** Conomatic **"ALL POSITION" END ATTACHMENT**, which has:

1. **Direct Drive to ANY Rotating Tool, in ANY or ALL SIX, Main End Slide Positions. Solid Tapping in ANY THREE Positions on ONE Set-up. Die Head Swing, D, clears COLLET CAPACITY in ANY Position.**

The above drawing shows Endworking Spindle, A, in a Main End Slide Position of a 1½" SIX SPINDLE Conomatic. Its splined shaft is rotated by the Attachment Drive Spindle, B. The drive from the Work Spindle Drive Shaft, C, is indicated. The Spindle, A, rotates in its bearing in an interchangeable Holder mounted to the Main End Slide, whose travel it may take. Three levers and cams offer independent travel to any three Endworking Spindles per single set-up.

2. **Accessible OPEN-END Application and INTERCHANGEABLE Attachment HOLDERS. Selective Speeds and Feeds.**

Six Attachment Drive Spindles may be applied to one set-up. Two are machine equipment. There is drive facility for 168 Speeds between 132 and 6158 RPM for drilling, boring, etc. Std. Drive Gears offer 10 Threading Speed Ratios.



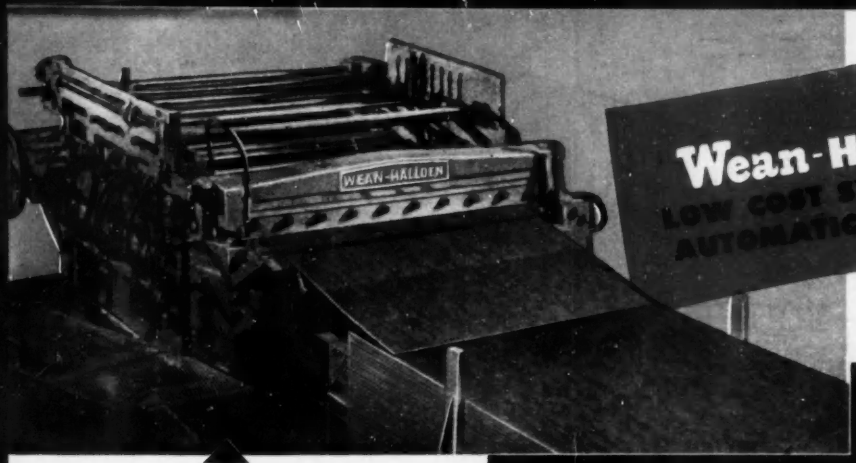
Buyer's Comparison Chart will guide you to full information



A Comparison of ALL Automatics is in Favor of Cone

5 Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



Wean-Hallden

LOW COST SYNCHRONIZED AUTOMATIC SHEAR LINES

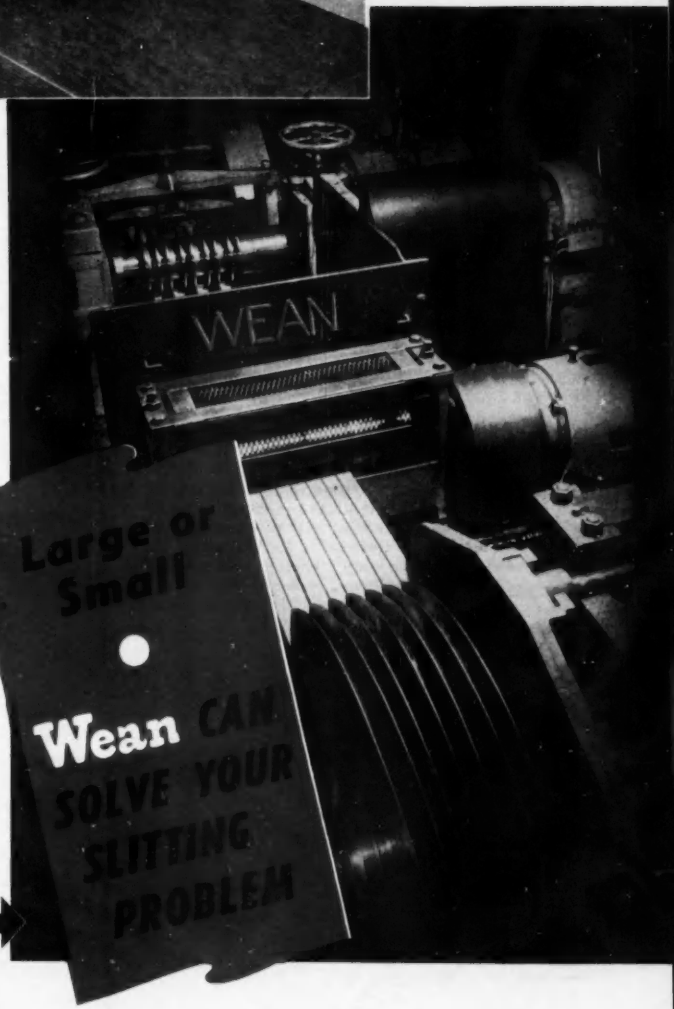
THE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring *less floor space*, delivers up to *twice the production*.

Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. *Before You Buy—Investigate Wean-Hallden.*

If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration.

Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate expensive extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

If you have a slitting problem — or merely desire a check on the efficiency of your present operation — call in Wean specialists.



Large or Small

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Wean CAN SOLVE YOUR SLITTING PROBLEM

Wean *Equipment Corporation*

CLEVELAND, OHIO



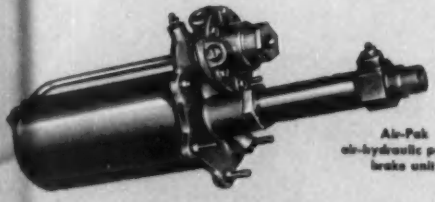
Either Way – YOU'RE ON THE ROAD TO BETTER POWER BRAKING!

There's no need to be puzzled about the question of efficient power braking for *any commercial vehicle*. Where the preference is for a hydraulic system, Hydrovac, with over two and a half million installations, has proven itself the undisputed leader in its field. And for vehicles where air actuated brakes are the choice, the new Bendix Air-Pak air-hydraulic power braking unit is foremost in its field.

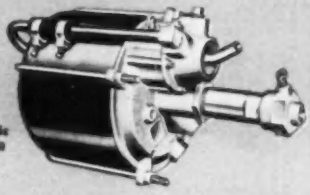
Air-Pak, similar in design and principle to the Hydrovac, changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance. Remember, regardless of size of vehicle or whether your preference is for vacuum or air actuated brakes, for the industry's finest power braking systems—specify Bendix® Hydrovac® or Bendix Air-Pak.

®REG. U.S. PAT. OFF.



Air-Pak air-hydraulic power brake unit



Hydrovac vacuum-hydraulic power brake unit

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High Spots of This Issue

Two Big International Automobile Shows

Italy's Automobile Show and West Germany's Automobile Show are both covered in excellent detail. Idiosyncrasies of selling internationally in Europe, coupled with the high prices of some models, contrast strangely with the homogeneous market that is America. See pages 32 and 40.

Engineering Developments in Aircraft Production

Here is given an analysis and description of tools and tooling methods developed and used at Northrop Aircraft. The company's notable advances in application techniques are highly important in this surcharged aircraft era. Page 34.

SAE Annual Aeronautic Meeting

Besides reviewing events at this meeting, held in New York City last month, this account includes abstracts from some of the excellent papers read there. Among subjects discussed are those on turbosuperchargers, the B-47 stratojet, turbine propeller powered aircraft, etc. Page 39.

Gears of Exceptional Quality

At Nash, improved tooth form and special production methods are combined in the manufacturing of synchro-mesh transmissions. The full story in achieving gears of "master" quality is told by the Master Mechanic of the Nash Motor Division, beginning page 42.

Chrysler V-8 Pistons, Rods, and Crankshafts

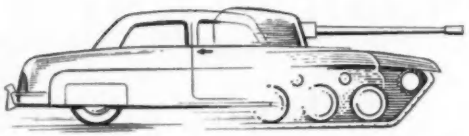
Unusual and new operations found on the Chrysler production lines are here described and illustrated, including a new make of connecting rod balancing machine with electronic brain control of the milling heads. Page 46.

27 New Product Items And Other High Spots, Such As:

An LPG conversion system for the Reo Gold Comet; measuring and recording muffler efficiency; improved military vehicles brought out by Dodge; the Business Pulse; and defense facilities approved for fast tax writeoffs.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT



Safer Now to Buy Alloys on Hardenability

The defense program requires conservation of strategic metals—so, as in the last war, alloy steel analyses are changing. Some standard alloys are still available. But many new, or interim, analyses are already on the market. Others are on the way.

Today more than ever, under these changing conditions, the safest way to buy alloys is on the basis of analysis *and* hardenability rather than on analysis alone. When we know the hardness or tensile strength you need, we make absolutely sure that the alloy you receive meets your requirements—even though it will be many months before standard hardenability ranges of the new steels are established. Here is how we do it:

We carefully test each and every heat of as-rolled and annealed alloy steel in our stocks. This gives us actual knowledge of the hardenability of every bar of Ryerson alloy. Thus when you specify on a hardenability basis you can be sure the alloy you get from Ryerson will meet your requirements. And you can also be sure of getting the desired heat treatment results because the test information and other helpful data to guide you come with the steel.

Not every company makes these tests, records this information, but Ryerson does—and at no extra cost to you. It's all part of a service system called the Ryerson Certified Steel Plan. So during this confusing period, order by AISI and SAE number if you wish but also specify hardenability and be doubly sure. Though some shortages are inevitable, we will do our level best to supply the alloy steel you need.

PRINCIPAL PRODUCTS

ALLOYS—Hot rolled, cold finished, heat treated. Also tool steel
CARBON STEEL BARS—Hot rolled and cold finished
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate
SHEETS—Hot and cold rolled, many types and coatings
TUBING—Seamless and welded, mechanical and boiler tubes
STAINLESS—Allegheny bars, plates, sheets, tubes, etc.
BABBITT—Five grades, also Ryertex plastic bearings
MACHINERY & TOOLS—For metal fabrication

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

News of the AUTOMOTIVE INDUSTRIES

Vol. 104, No. 10 May 15, 1951

Government Unopposed to 1952 Model Work

Despite NPA'S lack of enthusiasm for the high levels of passenger car production that have prevailed this year, the agency apparently still has no opposition to permitting automobile makers to complete work on 1952 models. At the recent meeting between NPA and industry officials, it was indicated that no arbitrary order prohibiting new model work was being considered. For its part, the industry told NPA that it expected no assistance in completing its tooling program, and that it would even take responsibility for helping machine tool builders and suppliers of other equipment if necessary.

Vehicles Registered Hit 49 Million in 1950

The Bureau of Public Roads reports that more than 49 million vehicles were registered last year, an increase of 4.5 million over the previous year. The total of 49,143,275 included 40,315,175 passenger cars, 8,604,448 trucks, and 223,652 buses. The largest increase was in passenger cars, up 10.7 per cent over 1949. Trucks registered increased 7.2 per cent and buses were up 7.1 per cent.

GM Research Presents New High Compression Engine

The General Motors Research Laboratories Div. has introduced a new "19XX" V-8 engine with 12-to-1 compression ratio as part of a fuel-engine survey presented at the midyear meeting in Tulsa, Okla., recently, of the American Petroleum Institute's Div. of Refining by Charles L. McCuen, GM vice president and general manager of GM Research Laboratories Div. The engine, mounted on a 1951 standard Cadillac sedan chassis, registered 29 mpg at 30 mph, and about 20 mpg at 70 mph during comprehensive road tests at GM's Phoenix, Ariz., laboratory. At a 40 mph cruising speed it gave 27.6 mpg. The economy performance of the engine was attributed to: (1) combination of an increased compression ratio and an improved Hydra-Matic transmission coupled with the "19XX" engine. (Mr. McCuen said that the new unit was developed by GM's Detroit Transmission Div.); and (2) fuel of higher octane rating available today, commercially, which was used in the "19XX" engine.

Chrysler Earns $13.3 Million in First Quarter

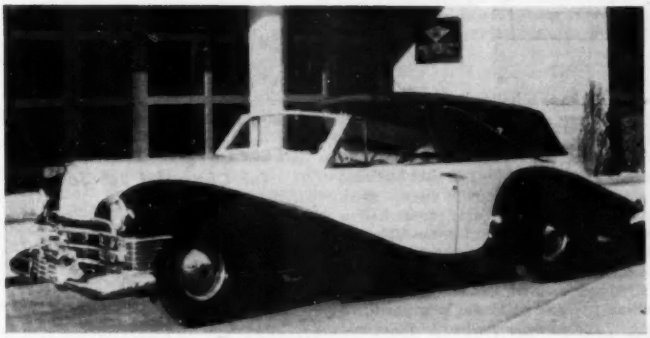
The Chrysler Corp. earned $13,316,672 on net sales of $626,204,540 in the first quarter of 1951, compared with a net loss of $1,782,790 on sales of $190,702,414 for the first quarter of 1950. In the 1951 quarter unit sales of Plymouth, Dodge, DeSoto and Chrysler cars and Dodge trucks were 370,310.

Dodge Building New V-8 Engine Plant

The Dodge Div. of Chrysler Corp., has under construction, a new addition to its truck plant at Detroit. It is reported that the building will be used for production of a new V-8 engine for Dodge passenger cars.

White Proposes to Buy Sterling Motor Truck

The White Motor Co. has entered into an agreement to acquire all assets of Sterling Motor Truck Co. The proposal is to be acted on by Sterling stockholders May 21. If the proposal is approved, all Sterling assets will be transferred to White in exchange for 52,862 shares of White common stock. White will also assume all liabilities and obligations of Sterling, which will dissolve as soon thereafter as practicable. The acquisition will give White a line of heavy duty off-highway gasoline and Diesel trucks, a field in which Sterling has specialized for many years. The Sterling plant in Milwaukee will continue to operate, with its products distributed through the White sales and service facilities.



Acme

TEXAS BOUND

Built by the Mexican National Distributor company on a 1950 Chrysler chassis, this custom-built automobile was exported from Mexico to San Antonio, Tex. It is to be displayed in several U. S. cities.

Industries Not Worried About Car Sales

With one or two exceptions, automobile factory sales executives do not appear to be unduly alarmed over the slow-up of new car sales at a time when the market normally takes an upturn. They feel that with production scheduled to fall off in the months ahead, the lag is only temporary, and that with aggressive selling there will be no real distress among automobile dealers. In-



Acme

CYCLE CYCLONE

At a reported record-breaking speed of 180 mph, Wilhelm Herts is shown whizzing down the superhighway from Munich to Nuernberg, Germany encased in his streamlined motorcycle.

ventories have admittedly increased for the industry as a whole during the past few weeks, but even so, the most popular makes are encountering no difficulty. The general idea is that business has gone from fabulous to merely good, that dealers particularly have had a distorted viewpoint on the market, and it will take a while for them to adjust to the competitive situation, which requires harder work and more aggressive selling in contrast to the long period of letting the customers come to them and plead for automobiles.

One disturbing factor is the definite slump in used car sales, particularly in the 1950 and 1949 models. Some dealers in Detroit are refusing to take 1950 models in trade because the market is so soft they are almost impossible to move. Any prolonged and severe slump in used car sales, sooner or later would affect new car purchases. However, if the industry is correct in its assumption that production is to be off 30 per cent in the third quarter and with employment and wages remaining high generally, sales later this year should not be a particular problem.

Westinghouse Forms New Air-Arm Division

The Westinghouse Electric Corp. has announced the formation of a new Air-Arm Div., and plans for a new 400,000 sq ft plant in Baltimore. By the year's end, Westinghouse expects to be producing for the Navy and Air Force automatic computers to direct gun and rocket fire, radar and auto-pilots for fighter planes and guided missiles, and complete airborne armament systems.

Piston Engine Substituted for Chevrolet Jet Job

Chevrolet will not build the Allison J-35-A-23 jet engine at its Tonawanda, N. Y., plant, as originally planned. Instead it will build the Wright R-3350 reciprocating engine which had been previously assigned to Hudson. According to the Defense Dept. announcement, it would be unnecessary and uneconomical to build a plant for Hudson to manufacture the R-3350 engine as had been planned. It is understood that Allison also will not go into production of the J-35-A-23 except for a few engines to be used for further development and testing.

Buick to Build Engine Plant at Chicago

Buick will build a new plant at Chicago for final assembly of jet aircraft engines which it will produce for the Air Force. The 1 million sq ft plant will be built about 16 miles southwest of the Chicago loop, and is scheduled to be completed early next year. Buick will manufacture parts for the engine at its Flint plant. Oldsmobile Div. also has a contract to supply the compressor and turbine unit for the engine.

Ford Adds Four More Defense Contracts

Ford has been assigned four more defense contracts. Lincoln-Mercury Div. has a contract to build J-40 jet engines for the Navy. A new plant will be built at a location not yet announced. The engine will be built under license from Westinghouse, which developed the J-40 for the Navy. The company will also build aircraft engine fuel injector systems for the Air Force at a new plant which will be built at a location not yet determined, and has two development contracts with the Detroit Ordnance district. One involves a study of a simplified and improved model jeep of lighter weight and lower manufacturing cost than those now in use. The other contract is for development of a special small caliber gun for the Army.

K-F in Production of Aircraft Parts

Kaiser-Frazer has made its first shipments of aircraft components being built for the Navy at its aircraft division at Oakland, Calif. A new building which will double the present 50,000 sq ft of aircraft manufacturing space at the plant will be completed in June.

Allis-Chalmers Awarded Order for Jet Parts

Allis-Chalmers Mfg. Co. will soon start construction of a $5 million plant at Terre Haute, Ind., for production of parts for the Wright J-65 Sapphire turbo-jet engine. Dollar value of the contract was not revealed, but it was indicated that it would total several million dollars. Allis-Chalmers will manufacture compressors for the jet engine as a subcontractor to Curtiss-Wright Corp. Production is expected to get started by next December, and when the plant is at full production, employment will total between 3500 and 4000 persons.

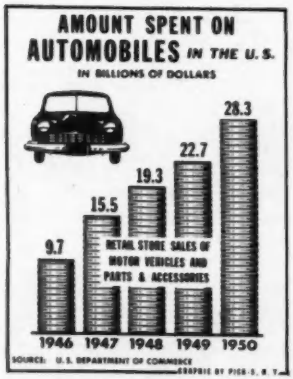
Action Delayed on New Car Prices

Although OPS has extended indefinitely its price order on passenger cars, which on March 1 permitted an increase of 3½ per cent, it has not closed the door on future price adjustments. In extending the price order OPS said that it wanted to study the effects of its manufacturer's price regulation on parts and materials going into passenger car production. It now appears likely that if automobile manufacturers appeal for price increases on hardship grounds, OPS will apply the ESA yardstick, which does not permit any price increases if the manufacturer's profit is 85 per cent or more of the average best three out of four years 1946-1949

inclusive. With decreasing volume resulting in higher overhead costs, material costs that have not yet been absorbed by price increases, and quite possibly another wage increase coming up June 1 under cost of living labor contracts, it is very possible that automobile manufacturers will apply for price relief within the next two or three months.

Materials Handling Conference Largest Yet

The Fourth Materials Handling Exposition and Conference (see cut on this page) was the largest and best attended of any so far. Registrations were over 20,000 (this figure does not represent total attendance), and 240 companies had millions of dollars worth of materials handling equipment



on display in indoor and outdoor exhibits at the International Amphitheater.

Among the participants in the materials handling conferences from the automotive companies were Jack O. Abney, supervisor of methods and standards dept., GM's Chevrolet Motor Div.; R. F. Weber, general supervisor, materials handling research, International Harvester Co.; Laurence J. Craig, supervisor of shipping and stores, GM's Hyatt Bearings Div.; Clifford C. Whiteford, manager of transportation dept., Ford Motor Co.; John G. Anderson, general supervisor, material handling engineering, GM's Cadillac Motor Car Div.; W. J. Dernberger, supervisor, material handling, mfg. engineering dept., Metal Stamping Div., Ford Motor Co.; and A. C. Heathcote, director of head office planning Massey-Harris Co., Ltd.

Car Production Quotas Under Consideration

For the first time since the government started imposing controls to limit passenger car production, there is some serious talk in Washington about establishing specific quotas which automobile builders could not exceed. As with the CMP plan, there is a split within the industry between large and small producers, with the latter agreeable to quotas and the large companies opposed. It is believed that if the quota system is imposed, it would be based upon the percentage of industry for each producer during the first six months of 1950. There would, of course, be adjustments for various companies. Apparently the smaller producers believe they would have a good chance of getting a little better break than their large competitors because of their lower break-even point. Reports are that a quota system might be invoked as early as June, but it seems more likely that if it comes at all, it will be in July.

There is always the possibility, of course, that NPA will hold off on quotas in the hope that the Controlled Materials Plan will limit passenger car production enough to make direct quotas unnecessary. There is, however, a feeling in Detroit that NPA is not willing to wait for the delayed action effect of CMP, which might not be felt until September, and that it already is pretty well set to impose some form of quota system. It is no particular secret that government officials are disturbed by the record first quarter production established by the industry, when they had counted upon materials limitations orders to reduce production. Even though passenger car output now is down considerably, it is still apparently too high to suit government officials.

Locking Differential Rights Assigned to Italian Firm

Detroit Automotive Products Corp. has concluded an exclusive production contract with Lancia & Co., of Turin, Italy, for production of the American company's automatic locking differential. Exclusive manufacturing and sales right for the "NoSPIN" differential have been granted to the Lancia group for Italy and its territorial possessions. The Italian government has awarded Lancia a contract to manufacture multi-drive axle army trucks equipped with the "NoSPIN" differential.

Misery-Loves-Company

Automobile companies are in the same boat with their customers concerning spare tires. They cannot put the fifth tire on company cars, but must go out and pay full retail price for the extra tire. They are not permitted to buy them wholesale. The industry believes that the fifth tire may soon be restored since the move was a fiasco that results only in the customer paying full retail price for the extra tire with no saving in rubber consumption.



INDOOR VIEW

This is an indoor view of part of the Fourth National Materials Handling show which was held April 30 to May 4, 1951 at the International Amphitheatre in Chicago, Ill.

1951 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Total Vehicles 1951	Total Vehicles 1950
January	478,589	127,583	661	606,833	581,362
February	506,865	111,935	521	618,321	475,485
March	617,393	136,794	829	755,022	580,652
Total—Three Months	1,601,853	376,312	2,011	1,980,176	1,637,499

1951 TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and Less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,500-26,000	Over 26,000	Total
January	58,290	23,692	7,864	23,289	6,717	6,361	3,370	127,583
February	48,978	19,436	7,612	20,054	6,321	5,972	3,562	111,935
March	59,036	27,810	10,597	24,348	5,061	6,373	3,571	136,794
Total—3 Mos. 1951	164,304	70,998	26,073	67,689	18,099	18,706	10,443	376,312
Total—3 Mos. 1950	136,361	61,944	23,338	46,389	10,353	8,377	5,349	294,135

* From Automobile Manufacturers Association.

Pool Orders for Machines Hit $100 Million

GSA has added another $21 million worth of machine tools to its "pool orders," to bring the total to nearly $100 million. The latest orders include: Bullard Co., $3,106,800; E. W. Bliss Co. $3,115,420; Giddings & Lewis, $4,788,-625; Clearing Machine Corp., $1,539,-493; New Britain Machine Co. $1,945,-000; Bardons & Oliver Inc., $1,525,017; Niles Tool Works Co. $2,539,950; Denison Engineering Co., $879,599; American Steel Foundries $865,680; and Hydraulic Press Mfg., Co. $689,304.

Libbey-Owens-Ford Forms New Fiber Glass Division

A new division to manufacture fiber glass has been formed by the Libbey-Owens-Ford Glass Co., and will occupy the company's Parkersburg, W. Va., factory with more than 200,000 sq ft of floor space. Equipment of the Parkersburg plant is being rushed so that production may be under way in about six months.

Three States to Require Turn Signals on Cars

The day is probably not far off when direction signals will be required on all new cars. New York, New Hampshire, and North Dakota already have passed legislation requiring turn signals on all new cars licensed after next Jan. 1.

GM Makes Fair Division of Hydra-Matic Drives

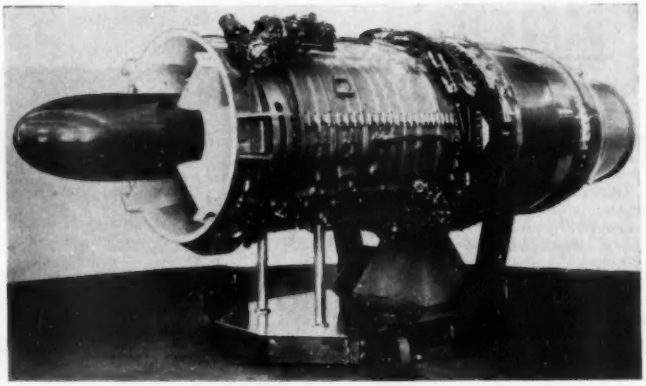
Reports that GM through its Detroit Transmission Div., was giving peferential treatment to its own divisions at the expense of other automobile companies using the Hydra-Matic transmission, are not borne out by the facts. GM'S material allotment for transmissions is based on its use of materials during the first half of 1950. Actually, during that period neither Hudson nor Kaiser-Frazer were using the Hydra-Matic, and consequently would have no base allotment. Nonetheless, both of these companies are continuing to be supplied Hydra-Matic, but in reduced number, as are other customers including GM's own divisions. Actually, the Kaiser-Frazer and Hudson allotments must come out of the base period of other users who had established a use allotment during the base period.

Car Makers Got 20 Per Cent of Steel in 1950

Automotive manufacturers in 1950 remained steel's largest single consuming group; they took 14,472,000 tons of steel, or 20 per cent of shipments, which was 32 per cent more than they got in 1949. Automobile makers used the 3.5 million tons of additional steel to establish a new production record of their own. A total of 8,002,782 trucks and automobiles rolled off the assembly lines to top by 26 per cent the previous record of 6,528,157 vehicles turned out in 1949.

SHIPMENTS OF STEEL PRODUCTS BY MARKET CLASSIFICATIONS: ALL GRADES INCLUDING CARBON, ALLOY AND STAINLESS (NET TONS)

Market Classifications	1950 Shipments (N.T.)	1950 Per Cent of Total	1949 Shipments (N.T.)	1949 Per Cent of Total
Automotive: Passenger Cars, Trucks, Parts, etc.	13,923,539	19.6	10,638,940	18.8
Forgings	549,168	0.8	323,954	0.6
Total	14,472,707	20.4	10,962,894	19.4
Aircraft	51,53	0.1	4 ,098	0.1



BUICK TO BUILD

This is the Wright J-65 Sapphire jet engine to be produced by GM's Buick Motor Div. under license from the Wright Aeronautical Div., Curtiss-Wright Corp. To be used in American fighter planes, the engine weighs 2500 lb, is more than 12 ft long, and has 7200 lbs thrust. Fewer critical materials are said to be used in the production of the Sapphire than in any other engine of its type. Although no figures have been released on the size of the Sapphire contract, Ivan L. Wiles, Buick general manager and GM vice president, has said that the J-65 project is the biggest single defense order Buick has ever received.

INDUSTRIES

Replacement Batteries Hit by Lead Order

Although the government order limiting use of lead is not expected to affect production of new cars and trucks, it will probably have a serious effect on the supply of replacement batteries. The order bases consumption of lead on the average monthly output of the first half of this year. Normally, only one-third of annual battery production occurs during the first half of the year, and industry sources estimate that if the order is not changed, annual production of batteries in the U. S. will be reduced about a third. Lead imports this year are expected to fall to about one-half of last year's record 520,000 tons, with domestic production only slightly higher than in 1950. The lead agreement with Mexico was terminated last Dec. 31, and with foreign buyers outbidding U. S. users, who are limited by price ceilings, less lead is being imported. It is believed that the government will be forced to take some form of action to increase the lead supply to avert a transportation breakdown.

Ex-Cell-O to Build New Ohio Plant

The Ex-Cell-O Corp. has announced that it will build a new plant at Lima, O., for the manufacture of aircraft engine parts. The new building will have 175,000 sq ft of space.

Motor Vehicle Exports Continue to Increase

Exports of passenger cars, trucks and buses continue their upward climb started early this year. Motor vehicles exported the first three months of this year totaled more than double the number in the same period a year ago. In the first quarter of 1950 exports numbered 56,956 compared with 119,118 for the first quarter of 1951. Biggest jump was in passenger cars, which went from 28,445 to 66,093. Truck exports increased from 28,458 during the first quarter of 1950 to 52,920 in the same period this year. Exports of motor coaches doubled from 53 in the first quarter a year ago to 105 for the same period this year.

Steel Company Merger Talks Terminated

Negotiations for a merger between The Pittsburgh Steel Co., and The Allegheny Ludlum Steel Corp. have been broken off. In a joint announcement by the two companies, it was explained that following a study of both companies' business and facilities, augmented by reports from independent engineering firms, the two managements had decided to continue as separate enterprises.

Exide Plans New Building for Engineering

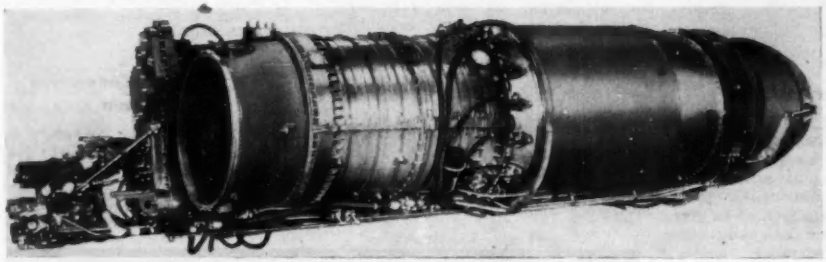
The Electric Storage Battery Co. has disclosed plans for a new building for its engineering department as part of the $5 million construction program now underway at its Crescentville plant in Philadelphia. The three-story building, 52 ft wide and 421 ft long, will provide 40,000 sq ft of net working area.

Chrysler Stepping Up V-8 Schedules

Chrysler Div., Chrysler Corp., is greatly increasing its schedules for cars equipped with its new V-8 engine. The expanded schedule calls for about 400 cars a day in May, 500 in June, and 600 daily in July, and continuing at that level through the model year. If the schedule is reached, output during June will be as great as the total of all such cars built during the first quarter. Chrysler expects to build about 12,000 more eight-cyl cars than were shipped in all of last year, which would indicate an expected volume of about 53,000 eight-cyl units.

Is the Jeep a Car or Truck?

Old soldiers never die, and neither apparently does the question of whether a Jeep is a car or a truck. That question has been disputed for several years and was thought to have been settled last year when railroads won a decision in the Court of Claims in Washington that the Jeep is a passenger car, and that freight charges could be levied on that basis. However, the government has now filed suit in Federal Court in Detroit, to recover $800 in alleged freight over charges for transporting 49 Jeeps, which the government contends should be classified as ¼ ton trucks and hauled at the lower truck rate. If the government wins the suit it might attempt to collect about 4 million in refunds on rail freight charges it has paid on Jeeps as far back as World War II. Civilian suits also might result if the government wins the case.



MORE THRUST

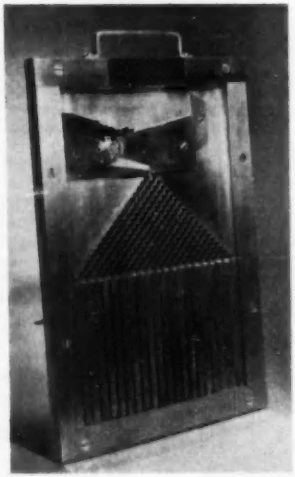
The Westinghouse J40-WE-6 turbojet aircraft engine, just released from the Navy secrecy list, is said to deliver more thrust than any other jet engine known to be in production. The slim, electronically-controlled engine is now in production at the Westinghouse aviation gas turbine division in Philadelphia.

Fabricast to Build Plant in Arkansas

GM's Fabricast Div. will build a new plant at Jones Mills, Ark., for the manufacture of aluminum castings used in torque converter transmissions. At the outset production from the 100,000 sq ft plant will be principally on defense items.

Slant-Back Styling for Cars Fading

The so called "fast back" or sloping back of automobile styling is rapidly fading out of the picture. A very popular styling that started before the war, the fast back has been losing out to the trunk or bustle back over the past two or three years. All GM divisions except Chevrolet have abandoned it, and in that division its popularity is fading. Nash still uses it, and Dodge and Plymouth each have it in one model. The Henry J is also a fast back design.



Portable Demonstrator

A small, portable device has been very effectively employed in quality control training for many supervisors, foremen, and other shop personnel in the Timken Roller Bearing Co. This demonstrator is generally used to give the initial appreciation for quality control to small groups of people.

The demonstrator pictured here shows the effectiveness of a quality-control chart. The balls are dropped one at a time, and after five are resting on top of the rod, the average and range are plotted. The range is the maximum number of slots between the balls of any sample above the rod which equals the maximum numerical difference between the various slots in which balls of the sample rest. The rod is then pulled and the balls drop to the base of the demonstrator.

This procedure of dropping five balls as a sample is continued until 25 samples have been dropped, evaluated and plotted on the quality control charts. Quality control limits are then calculated, by arithmetic, and placed upon the charts. The complex mathematical calculations are made that simple, while at the same time embodying the law of probability. These control limits then are the maximum extremities that the demonstrator is expected to operate within, unless another cause of variation is added.

The effectiveness is then shown by extending the control limits and placing a rubber eraser under one corner of the demonstrator. Now by dropping more samples it will be found that the values plotted on the chart go out of control very quickly. This shows that something has been changed to give different results, which in this case is the eraser.

However, when a control chart is used on a machine, causes for variation are not purposely added so that the control chart is a very effective tool to show when the machine is operating in or out of the normal expected variation.

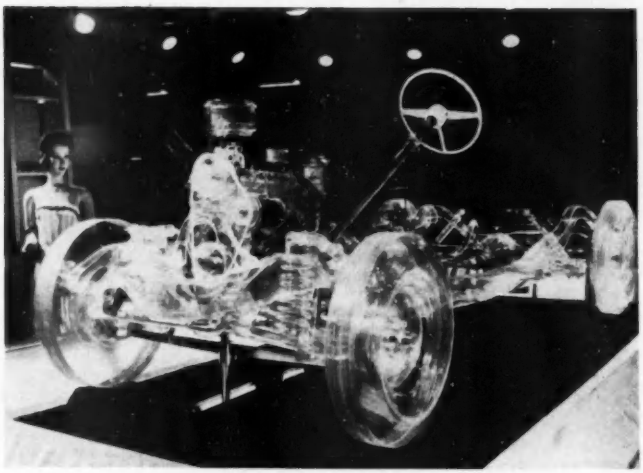
Largest Metal Powder Show in History

The attendance of over 600 people made the 7th Annual Meeting and Metal Powder Show, held in Cleveland recently, the largest in the history of the Metal Powder Association. The technical program this year featured a number of sessions and papers dealing with military applications of powder metallurgy, including a meeting of the powder metallurgy committee of AOA. Among the more promising applications of this technique is the potential use of sintered irons for rotating shell bands, and metal powders in small arms ammunition. Papers dealing with these specific applications were presented by Col. G. A. Miller, Jr., Frankfort Arsenal, and A. M. Burghardt, Watertown Arsenal. If and when such applications are developed and accepted, they can be instrumental in releasing an enormous volume of critical materials and considerable labor. The following companies presented exhibits of powders, presses, products, and heat treating equipment at this event:

American Instrument Co., Silver Spring, Md.
Antara Products Div., General Dyestuff Corp., N. Y., N. Y.
Arthur Colton Co., Detroit, Mich.
Cavitron Equipment Corp., N. Y., N. Y.
Ekstrand & Tholand, Inc., N. Y., N. Y.
Electric Furnace Co., Salem, Ohio
Empire Coil Co., New Rochelle, N. Y.
Federal-Mogul Corp., Detroit, Mich.
Charles Hardy, Inc., N. Y., N. Y.
Kux Machine Co., Chicago, Ill.
Metals Refining Co., Div. of the Glidden Co., Hammond, Ind.
New Jersey Zinc Sales Co., N. Y., N. Y.
Plastic Metals Div., National Radiator Co., Johnstown, Pa.
Radio Cores, Inc., Oak Lawn, Ill.
Raybestos - Manhattan, Inc., Bridgeport, Conn.
F. J. Stokes Machine Co., Philadelphia, Pa.
Wel-Met Co., Kent, O.

Quality Control Convention in Cleveland

Quality control will be the subject of intensive discussion at the Fifth National Convention of the American Society for Quality Control to be held in Cleveland, O., on May 23 and 24.



Acme

SEEING IS BELIEVING

First displayed by Chrysler's Plymouth Div. at the Chicago Automobile Show, and shown more recently in Detroit, this plastic chassis display is of a 1951 Plymouth. Made of transparent plastic, it is illuminated by black light, and the moving parts of the power plant and rear wheels are actuated by a small electric motor. All the internal workings of the engine, transmission and differential are visible to the spectator. It took a year and a half for Plymouth to build the model.

INDUSTRIES



JET VERSION

The XC-123A, jet powered version of the U. S. Air Force's Chase XC-123 is shown here taking off on its first flight recently at West Trenton, N. J. Both the XC-123 and the XC-123A were developed from the Chase CC-20 all-metal cargo glider. The XC-123 is a propeller driven assault transport version of the CC-20 powered by two Pratt and Whitney R-2800 piston engines rated at 2100 hp each. The XC-123A is a jet propelled version of the same basic airframe powered by four GE J-47 turbo-jet engines rated at 5200 lb of thrust each.

This meeting will feature presentations by top-ranking military personnel on "What the Armed Services Expect of the Contractors' Quality Control Department" and on "The Principles and Practice of Military Standard 105-A." Military Standard 105-A will be the overall standard of acceptance of material by the armed services. Numerous technical papers covering applications of quality control and the use of statistical techniques in assembly work in the metals, chemical, electronics, and pharmaceutical industries will also be presented. Over forty exhibits will illustrate applications and quality control at work, together with practical demonstrations of equipment aids such as measuring devices, calculators, and computers.

Johnson to Direct NPA Motor Vehicle Unit

Courtney Johnson, assistant to the president of Studebaker Corp., has been appointed director of the Motor Vehicle Div. of NPA. He will be responsible for coordinating automotive production for defense purposes with a minimum disruption in civilian needs. Robert Cass, assistant to the president of White Motor Co., has been named deputy director of the Division.

Geschelin Speaks in Philadelphia

Joseph Geschelin, Detroit Editor, Automotive Div., Chilton Co., was one of the principal speakers at a panel meeting of the Eastern Industrial Advertisers' Association in Philadelphia on May 3. His talk was entitled "Guns and Automobiles," in which he emphasized the diversified manufacturing activities of the automotive industries in making vehicles for military and civilian use, together with other rearmament projects.

Westinghouse Has Editorial Conference

An editorial conference on "Trends of Electric Power in Industry" held last month at the East Pittsburgh Works of Westinghouse Electric Corp. featured three papers dealing directly or indirectly with manpower in addition to technical sessions on "The Influence of Materials on Future Design" and "Motor Control—Rotating, Electronic, and Magnetic." In his paper on the influence of materials on future design, L. R. Hill, assistant manager, Materials Engineering Dept., said in part: "Experience in many sections of American industry has shown that it takes seven to 10 years for a development to progress from the test tube or embryonic stage to commercialization. Research and development work have grown so complicated that a good idea is no more than a hunting license, a preliminary to the expenditure of thousands or millions of dollars in a preliminary survey, and then the expenditure of about 10 times this amount in an attempt to commercially exploit the idea in a market that may or may not be receptive to it, market surveys notwithstanding."

Also featured during the one-day conference were plant tours and sessions conducted by Westinghouse department heads on specialized subjects. Attendance was excellent and approximately 50 trade publications were represented.

Hayes Manufacturing Co. Buys Canadian Firm

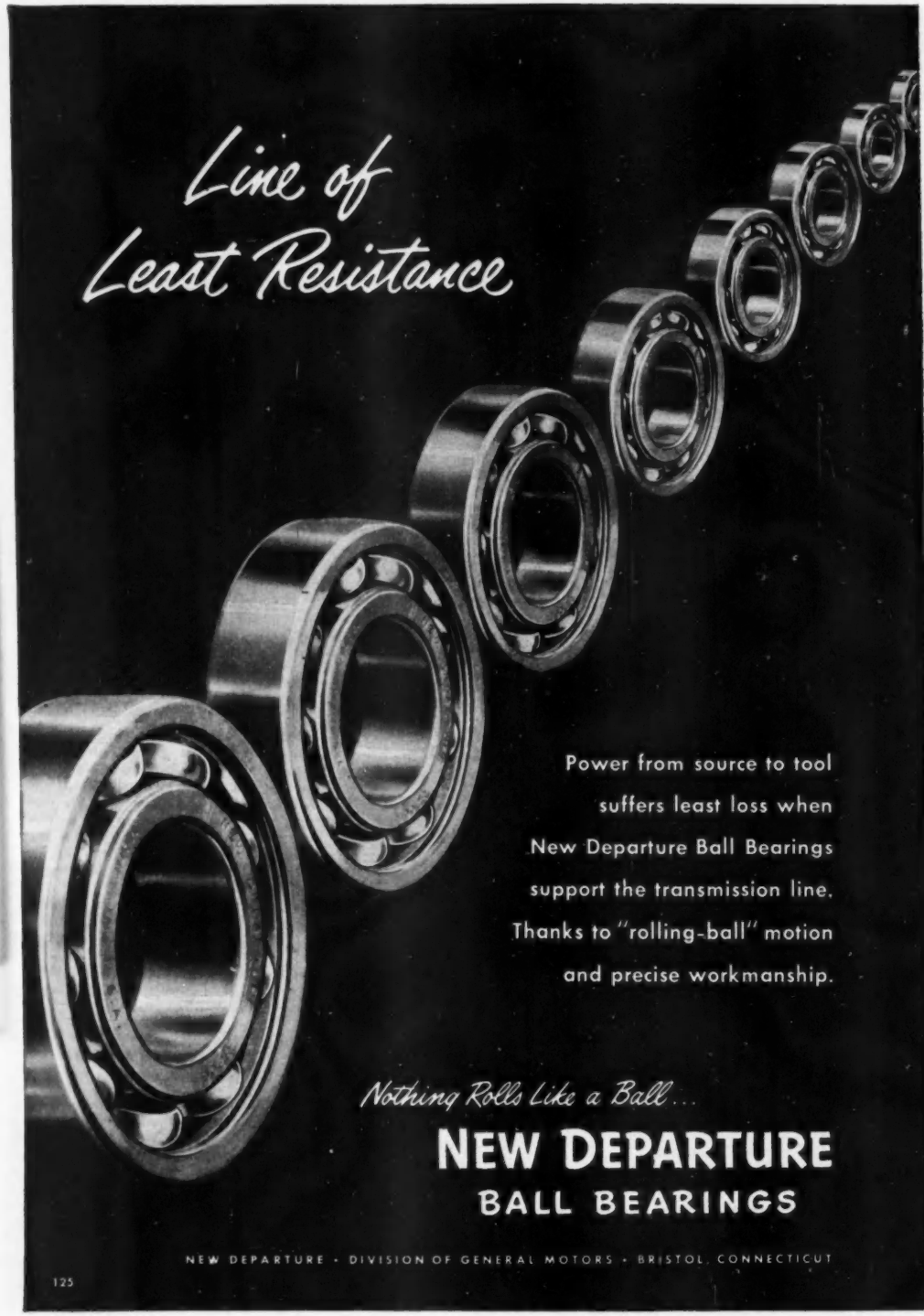
The Hayes Manufacturing Co. has acquired ownership of Bawden Machine Co. Ltd. of Toronto, Ont., Canada, manufacturer of mechanical, hydraulic and filter presses, rubber mills, plastic molding machinery, and marine equipment. The new company has been renamed Bawden Industries Ltd., and will augment activities of Affiliated Engineering Ltd., Montreal subsidiary of American Engineering of Philadelphia, which is wholly owned by Hayes.

Higher Taxes and Costs Cut Automotive Profits

The effect of higher taxes and increasing costs, together with ceiling prices, are showing up in quarterly financial reports of automotive companies. Taxes particularly are cutting sharply into earnings. A good example is Reo, which paid out $1,036,000 in taxes during the first quarter, leaving an estimated earnings total of $664,000. Studebaker sales were nearly $16 million higher in the first quarter of this year than for the same period a year ago, but net income fell to $4.9 million, compared to $6.9 million during the first three months of 1950. Borg-Warner earnings before taxes for the first quarter of this year totaled $14.3 million compared with $10.5 million in the same period a year ago. However, greatly increased income tax rates plus the excise profits tax, resulted in a decline in net earnings from $6.5 million in the first quarter of 1950 to $5.7 million in the same period this year.

K-F Seeks $25 Million Loan From Banks

Kaiser-Frazer is negotiating for a $25 million loan of additional capital from private banks. Negotiations are with Mellon National Bank, the Bank of America, and other private lending institutions. The additional funds will be used to finance defense production. K-F currently has outstanding loans totaling $50.2 million from RFC. Since 1949 K-F has borrowed from RFC approximately $65 million in loans, and in lines of credit, but it is believed that it did not use all of the $65 million.


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Least Resistance
Power from source to tool
suffers least loss when
New Departure Ball Bearings
support the transmission line.
Thanks to "rolling-ball" motion
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125

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Packard Motor Co.—**Homer A. Vilas**, a member of the stock brokerage firm of Cyrus J. Lawrence & Sons, has been elected a director. **B. C. Budd**, general manager of overseas operations, was appointed vice-president in charge of the export division.

Ex-Cell-O Corp.—**Phil Huber**, president and general manager, has been elected to a new post of board chairman. **H. Glenn Bixby**, vice-president and treasurer, has been named president and general manager. **James K. Fulks**, previously vice-president in charge of manufacturing, has been elected to the new position of executive vice-president. **Earl E. Conlin** has been promoted to secretary and treasurer, from his previous post of secretary and assistant treasurer. **Milton B. Montgomery**, formerly factory superintendent, has been named vice-president in charge of manufacturing.

Bendix Aviation Corp. — **Edward K. Foster** has been elected a vice-president and member of the administration committee.

The New Britain Machine Co.— **Herbert H. Pease** will retire as president and continue as chairman of the board. **Robert T. Frisbie**, who has been first vice-president, was elected president; **Ralph S. Howe**, who has been vice-president, was elected executive vice-president; **Julian C. Pease**, who has been secretary, was elected a vice-president, and also a director of the company; **William J. Lofgren**, who was treasurer, was elected secretary and treasurer.

Boeing Airplane Co.—**C. B. Gracey** was elected to the newly-created post of vice-president—operations.

The B. F. Goodrich Co.—**William S. Richardson**, president, the B. F. Goodrich Chemical Co. has been named vice-president.

National Automotives Fibres, Inc.— **Robert J. Stack** was elected president, succeeding J. R. Millar, who continues as chairman of the board.

Borg-Warner Corp.—**Edmund F. Ball**, president of Ball Brothers Co., was elected to the board of directors. The appointment of **Donald N. Arndt** as assistant general sales manager of the Marvel-Schebler Products Div. has been announced. **G. E. Campbell** has been named assistant works manager and



White Motor Co. — Karl A. Roesch has been appointed general manager of the motor coach division.



Consolidated Vultee Aircraft Corp.—A. P. Fontaine has been elected a vice president and general manager.



Willys - Overland Motors, Inc. — Howard P. Grove has been named general sales manager for the U. S.

Donald A. Sutherland industrial sales manager of the Pesco Products Div.

United States Rubber Co.—**H. Gordon Smith** and **John W. McGovern** were elected directors.

General Motors Corp., United Motors Service Div.—Appointment of **Charles P. Culhane** as general sales manager has been announced.

Asbestos Manufacturing Co. — **William A. Blume** was elected president.

Kaiser-Frazer Corp. — The appointment of **Nils O. Eklund** as general sales manager has been announced. **E. W. Berger** has been named assistant to the vice-president in charge of sales.

Aluminum Company of America— **Roy A. Hunt**, president, has been named chairman of the executive committee and **I. W. Wilson**, senior vice-president, has been elected president.

Ward LaFrance Truck Corp.—**John J. Mosher** has been appointed vice-president and **F. N. Tracy**, vice-president in charge of sales.

Torrington Manufacturing Co.—The appointment of **Dudley B. Robinson** as general sales manager has been announced.

The Budd Co.—**Fred T. Roberts** has been named manager of truck, bus and trailer wheel sales.

The Heil Co.—The appointment of **John Barclay** as general sales manager has been announced.

Sterling Engine Co.—**Irving Mitchell Felt**, chairman of the finance committee of Graham Paige Corp., has been elected a director.

E. W. Bliss Co.—**Oswald L. Johnston** has been elected chairman, succeeding **Robert C. Enos**, who became chairman of the executive committee.

Acme Steel Co.—**Fred M. Gillies**, executive vice-president, was elected to the board of directors; **William C. Fork**, works manager, was elected vice-president.

The Cleveland Automatic Machine Co.—Added to the board of directors, increasing its membership from seven to nine, were **A. F. Jelinek**, chief engineer, and **J. C. Maezer**, factory manager.

The Monarch Machine Tool Co.— **Sailor E. Beer** has been named distributor sales manager.

Necrology

David Fergusson, 81, a designer for the Pierce-Arrow Motor Company, Buffalo, died April 27 in Rochester, N. Y.

John R. Cautley, 67, staff engineer, Bendix Aviation Corp., and an aviation industry pioneer, died April 24 in Martinsville, Ind.

Edwin Boyd Jackson, 74, president, Lock Thread Corp., and a pioneer in the automotive sales field, died April 15 at St. Simons Island, Ga.

George Hanford, 75, a comaker of the early Hanford-Rogers automobile, April 3, in Cleveland, O.

Pierre Prevost, former president of the French Society of Automobile Engineers (SIA), died April 15 in Paris

William T. Hunter, a director of the Scovill Manufacturing Co., died April 19 in White Plains, N. Y.





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A typical example of the many products which call for the use of not one...two...but *all three* types of abrasives in the manufacturing process are shears. Thus at three different stages it is important to be able to count on the performance of a coated abrasive, a bonded abrasive, or abrasive grain in obtaining best results.

You'll find it pays to standardize on Abrasives by CARBORUNDUM for these varied grinding, sanding or finishing operations. Only CARBORUNDUM manufactures a *complete* line of abrasive products from which you gain the advantage of uniform high quality...and an impartial recommendation of the *right* abrasive for each operation. See your CARBORUNDUM representative, or write Dept. AI 80-22.

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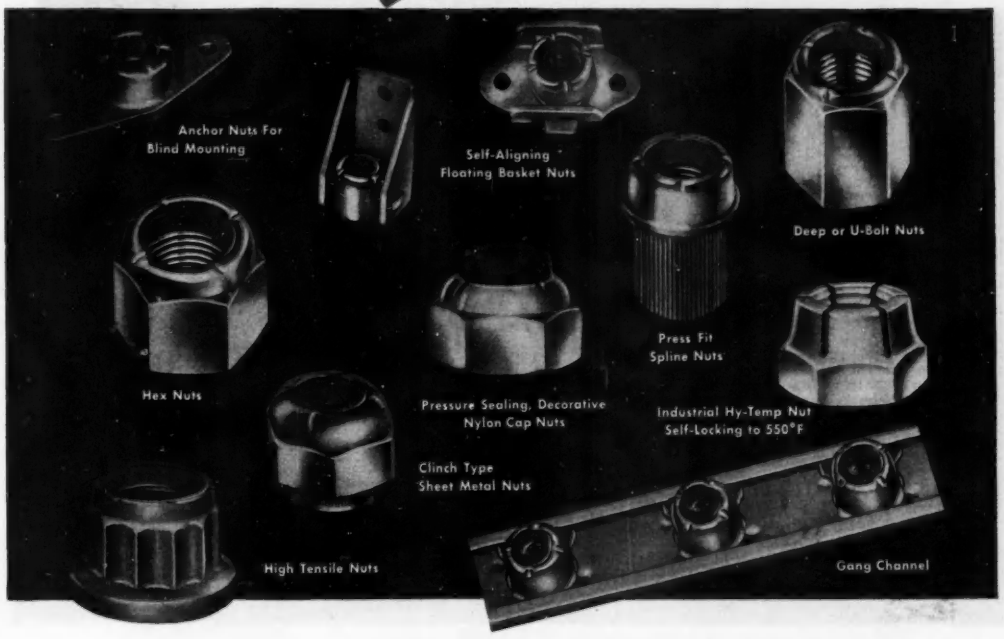
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ESNA *Self-Locking* FASTENERS



3011 ways to solve your Fastening Problems

When fastening problems come up, are you ready with an immediate answer? Or, do you find that many of your problems are major design jobs?

If fastening presents any problem at all, Elastic Stop Nuts can supply the answer fast. In stock, ready for delivery to you when you say the word, ESNA has 453 off-the-shelf answers to your problems. Tooled for production, ESNA has 2558 more.

Yes, 3011 types and sizes of Elastic Stop Nuts cover just about every fastening job you run into. And the self-locking action of the Red Elastic Collar is your guarantee of performance. For instance, when you want to pre-stress a bolt to assure proper load distribution; or if you must "set" and maintain an exact spring-loaded adjustment; the torque provided by the grip of the Red Elastic Collar on bolt threads, will do the job. When you've got to have a fastener with a locking hold that can't be shaken loose by the toughest mechanical or operating vibration, the answer is an Elastic Stop Nut. If you need a fastener that will protect internal bolt threads against corrosion and assure easier repair jobs . . . the moisture seal and guarantee of reusability provided by the Red Elastic Collar means that your fastener is an Elastic Stop Nut.

Problems like yours are solved at ESNA day after day—and have been since 1927. In the railroad industry, in the oil fields, in automobiles, aircraft, and construction projects, reusable, precision-setting Elastic Stop Nuts are doing the kind of fastening job you're looking for.

If your problem is a common one, ESNA will supply one of the 3011 types of Elastic Stop Nuts immediately. If you need a special design, ESNA will make quick work of your problem by handling both design and manufacture. Why not get ready to handle that next fastening problem now? Send details of your problem, or write asking for a call from an ESNA engineer. For the new ESNA catalog, write Elastic Stop Nut Corporation of America, Union, N. J.

ESNA

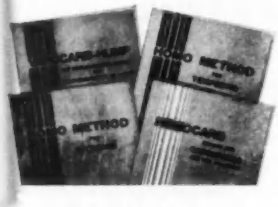
ELASTIC STOP NUTS



Silversmith's Way of Improving Tools Gives More Production Per Tool Dollar

Photos courtesy Towle Manufacturing Co., makers of sterling silver knives, forks, spoons and other tableware. Fork die shown is the King Richard Pattern.





Read About COST-CUTTING PROCESSES In These Catalogs

We supply complete Furnace Processes to regulate all action inside the heat-treating furnace, for hardening, tempering, normalizing, carburizing, nitriding, steam-treatment, dry cyaniding. See us if you want heavy production at low cost!

Address nearest office, or 4966 Stenton Ave., Phila. 44, Pa.

Jrl. Ad T-620(32)

TOWLE Manufacturing Company is one of the firms which successfully lengthens the production life of its forging dies. And Towle's method is basically "right" for other metal-working firms, whether they use expensive tools or simple ones, because Towle is interested in heavy production . . . the last possible piece from every die.

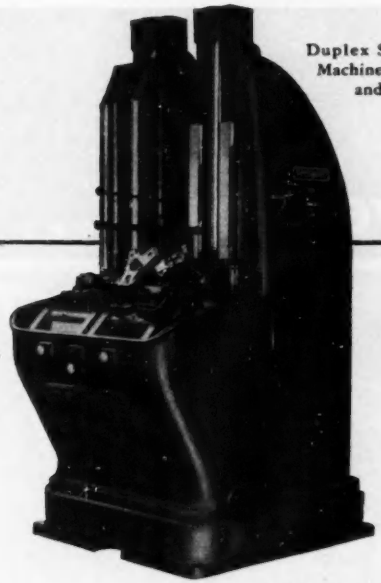
Towle's plan starts with the usual printed form for each die, on which are entered the heat-treating temperature, time, quench, hardness, etc., and the production from the tool, so that when it is retired the company can tell whether or not it produced well.

So far, of course, many plants use this routine; but Towle adds a "pay-off" step—they never throw a sheet away, regardless of the yield from its die. The sheet becomes a guide as to whether succeeding tools should be used differently, or made of a different steel, or heat-treated differently.

As far as heat-treatment is concerned, the pay-off lies in Towle's facilities for either reproducing or changing the treatment, as they wish. Their Vapocarb-Hump Hardening and Homo Tempering equipments do exactly as the heat-treater says. With them, he can secure the desired structure, hardness and temper, just as a toolmaker can set the feed and speed of a filing machine. Guesswork is ended; the heat-treat becomes a place where specifications are followed to the letter.

Reasons for the dependability of these L&N Methods are given in the Catalogs at left; they explain why more and more plants are finding that it pays to Vapocarb-Hump Harden and Homo Temper all tools.

LEEDS NORTHRUP

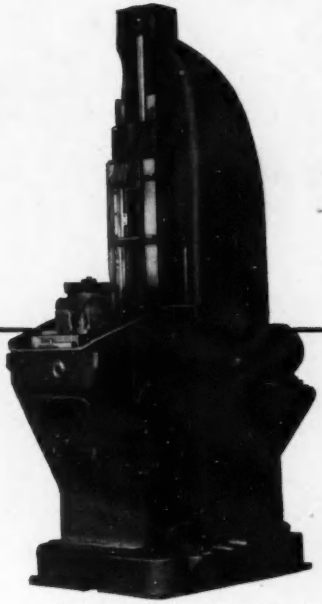


Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.



Continuous Type Broaching Machine. Made in 4 Sizes.

investigate surface broaching for difficult machine work



Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

● Many types of work can be surface broached on Footburt machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Holding fixtures are designed for quick, convenient loading. Cutting tool maintenance costs are low. We will be glad to work with you on the application of surface broaching.

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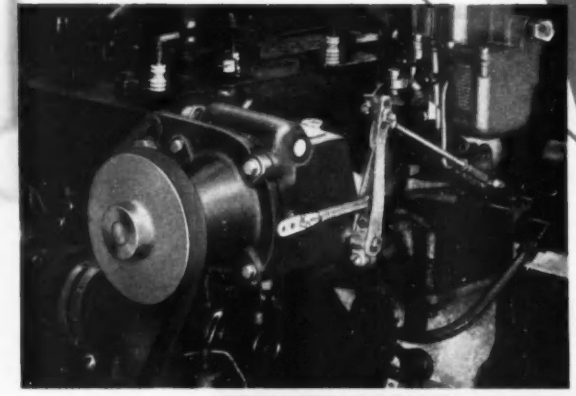
FOOTBURT surface broaching

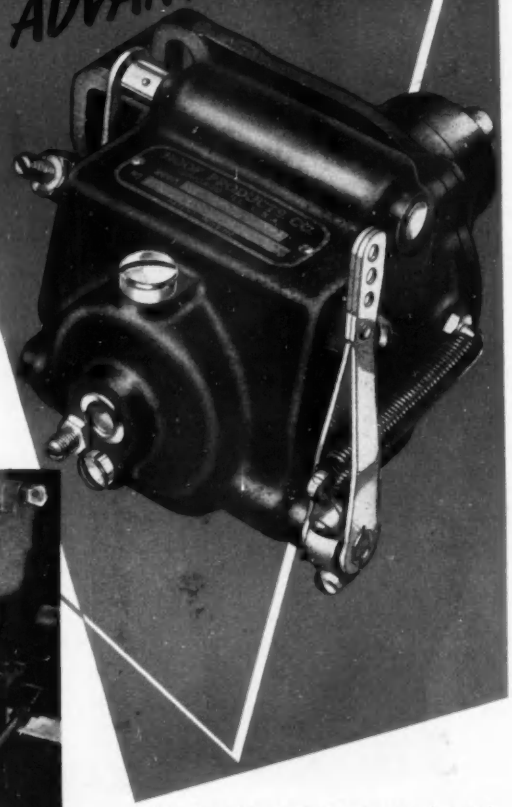
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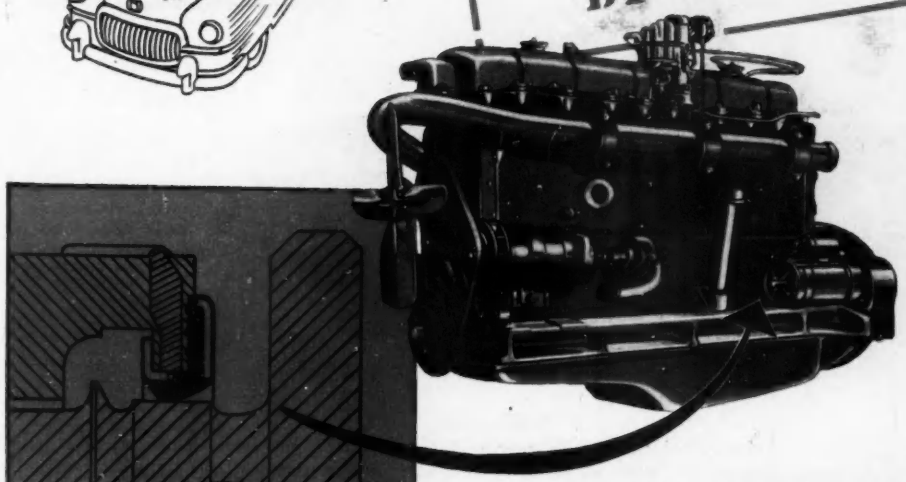
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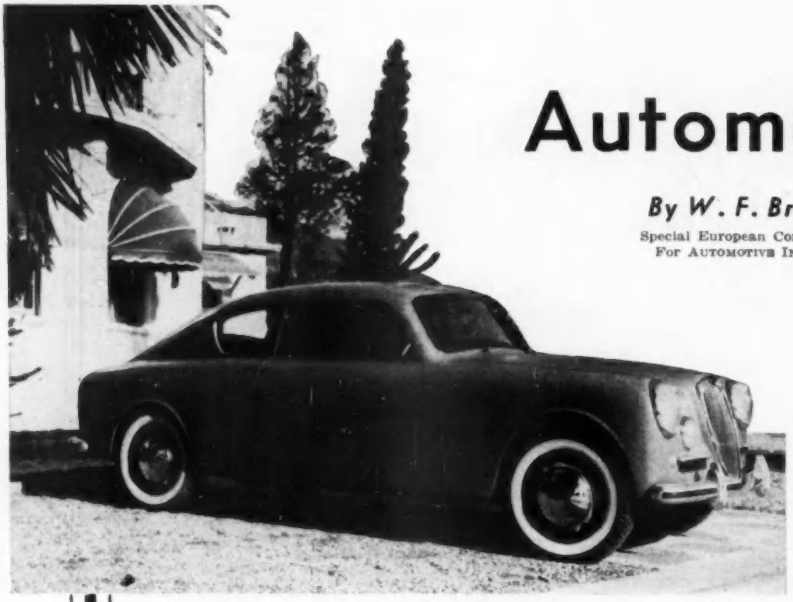
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Automotive

By W. F. Bradley

Special European Correspondent
For AUTOMOTIVE INDUSTRIES

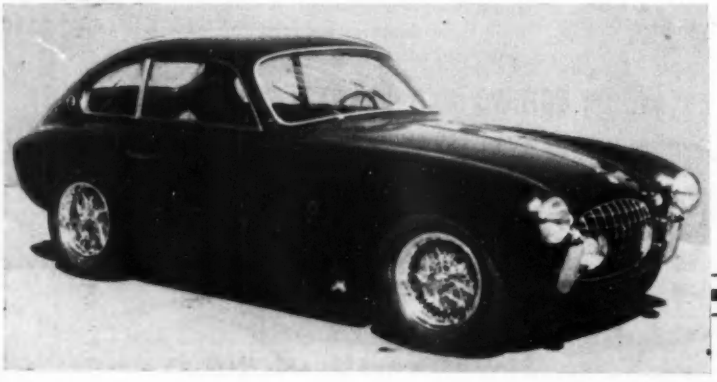


New Lancia long-distance touring sedan.

TURIN, ITALY

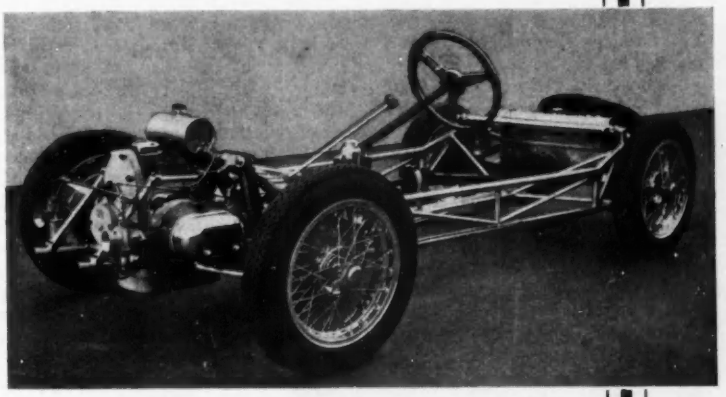
ITALY'S international Automobile Show, held on the banks of the River Po, at Turin, could claim to lead the world in artistic setting. The specially erected reinforced concrete building, with a roof span of 560 ft, is surrounded by gardens and open spaces for large vehicles and for parking. Within a mile there is a track in the hills on which impressive demonstrations could be given. Occupied space this year was increased to 200,000 sq ft and the number of exhibitors exceeded 400. Of the 59 passenger car manufacturers occupying stands, 20 were from the United States, the same number from Britain, nine represented the Italian industry, six were from France, and four from Germany. American cars exhibited were Buick, Cadillac, Chevrolet, Chrysler, Crosley, De Soto, Dodge, Ford, Frazer, Henry J., Hudson, Kaiser, Lincoln, Mercury, Nash, Oldsmobile, Packard, Plymouth, Pontiac, and Studebaker.

The restrictive commercial wall, which exists in all European countries, has been partially lifted between Italy and France, under the new cooperative scheme. France is free to export $430,000 worth of automobiles into Italy during the coming year, and Italy can send a rather higher value into France. The allowance will be proportioned by the national manufacturers' associ-



O.S.C.A. sedan which weighs 1500 lb.

Activities in Italy

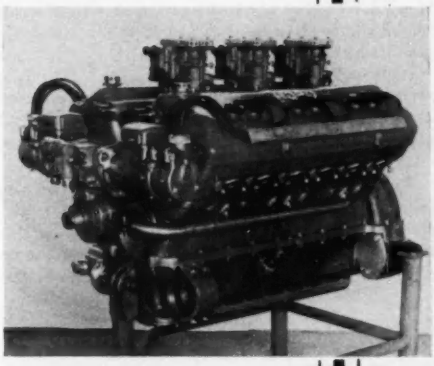


Chassis of Nardi race car with a 45 cu in. two-cyl engine.

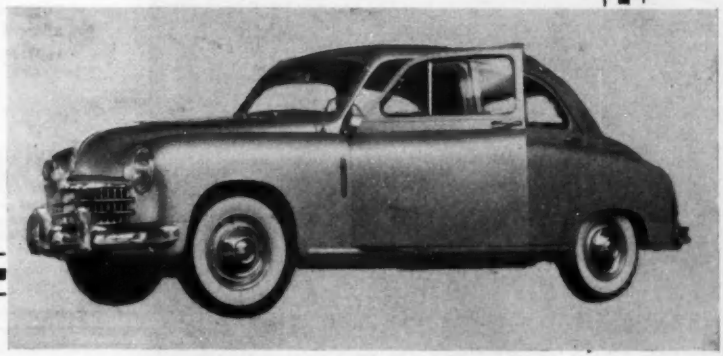
ations of the two countries, the order of importance, for France, being Citroen, Renault, Peugeot, and Simca. It is because of this trade agreement that France had a really important participation in the show for the first time. Even Simca, which originally was an offshoot of the Italian Fiat and is still building cars under Fiat license, is now competing against the parent company. The Italian order of importance is Fiat, Lancia and Alfa Romeo, all the others being small producers. Import duties remain, these at present varying from 35 to 45 per cent ad valorem, according to the size of the cars. A movement is afoot to lower these duties.

All exhibitors were allowed to sell on Italian territory six exhibition cars or cars brought in during the exhibition period. In certain cases this is a doubtful advantage, and some makers had difficulty in selling the three cars they were allowed to import on previous years. The American industry probably gets greater advantage from this arrangement than any others, for sales

(*Turn to page* 118, *please*)



O.S.C.A. 12-cyl. overhead-camshaft engine.



Fiat's exhibit included this self-operating car.

Engineering Developments

By T. E. Piper
Chief Materials and Process Engineer,
Northrop Aircraft, Inc.

DURING the World War II period considerable advancement in development of new production processes and tools for the aircraft industry was made. The cream of these tools and processes have been retained on the basis of their economic efficiency for the production of a small number of identical parts with a rapid change from production of one part to another. Since the war production processes and tooling have continued to develop and improve. This continued development and improvement is due in part to ever increasing performance characteristics of aircraft and, on the other hand, due to the competitive need to use more efficient airframe manufacturing methods.

Increased smoothness requirements of high speed aircraft require closer tolerances of skin contours and connecting substructure. Increased smoothness affects production design, and jigging, forming and assembly methods.

Space limitations are ever present in the aircraft industry and in some cases are becoming more pronounced, i.e., thinner airfoil sections of the modern high speed aircraft. When space is critical the design of a part is often restricted because of this limitation. As a result it may be necessary to devise new or modified production methods, or at least form, fabricate or tool to more difficult conditions.

Because of the ever increasing performance characteristics of aircraft, materials with greater mechanical design properties—increased ultimate tensile strength, yield strength, etc., and/or lower weight-strength ratios—are continually being sought for and designed where necessary. It has been found that the stronger materials require advanced process and tooling techniques. More efficient designs of welding, forming and fabrication tools are needed and a greater degree of tool rigidity and strength is required. Materials of lower elongation or ductility are being used to a greater extent where they also exhibit high strength or light weight. This is necessary since high ductility and elongation are not always associated with materials of high strength or small weight-strength ratios. These materials must be formed, fabricated, and/or welded in spite of their limited elongation and ductility. Different welding, forming and fabricating design, processes and tools are often necessary from those normally used with the more ductile materials.

The necessity to design production military aircraft in a manner compatible with the military requirements for interchangeability and replaceability, i.e., sectionalizing the aircraft for field service breaks and producing such field service joints with sufficient accuracy to allow direct interchangeability of any replacement part or assembly for the

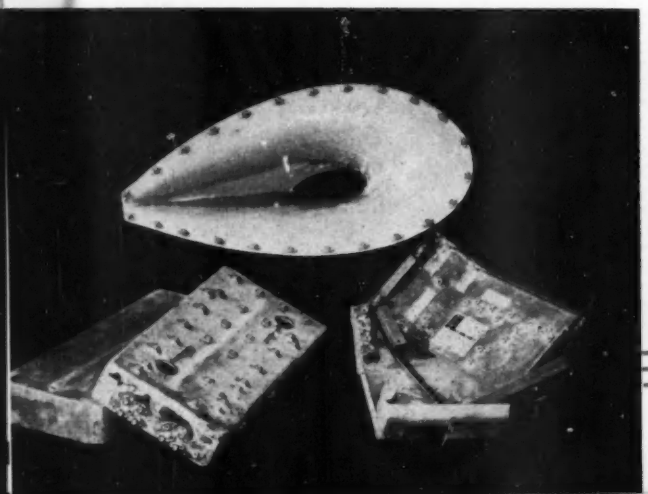


Fig. 1—This view shows a strut fairing made from laminated glass fiber cloth plastics, and trim templates made by the same process with actual parts shown nested in templates to indicate relation of template to part.

in Aircraft Production

original part or assembly, imposes many engineering and production problems and limitations.

Since World War II the quantity of aircraft produced has been small as compared to the quantity during the war. This has resulted in smaller individual contracts and a relatively small number of any one part being made. This trend has necessitated the development of processes and tooling that will produce economically a small number of identical parts with a rapid changeover from one part to another.

All of the above factors affect the trend which production engineering developments in the aircraft industry have taken since the last war. A discussion of some of the tooling, forming, fabricating and other problems and the developments that have resulted from the solution of these problems is now necessary to further amplify and clarify the previous general remarks.

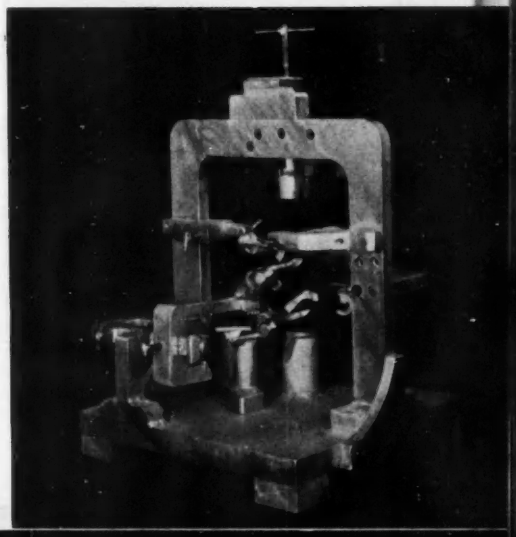
In general, tools and tooling methods can be divided into three types: Experimental or job-shop tools; limited production tools; and mass production tools.

Experimental or job-shop tools, most economical for producing one to several parts of one kind, are used largely for producing experimental aircraft.

With limited production tools greatest economy is in producing a small number of parts of the same kind; approximately 20 to 500 parts. Further economy is introduced by tooling methods allowing a rapid changeover from production of one part to production of another. This type of tooling is used extensively at present in the building of military aircraft.

Mass production tooling methods have been developed largely by automobile manufacturers, and aircraft has borrowed from this source to fill most of its needs for this type tooling. In general, mass production tools are most applicable for production of thousands of identical parts or for performing and repeating a given operation rapidly, efficiently and for a long period of sustained or intermittent operation. In many cases they are but specialized limited production tools.

The most notable and the greatest amount of recent tooling development has been in limited production tools. Forming equipment, for example, has been increased in size, capacity and versatility to allow forming of stronger materials, heavier gages, and



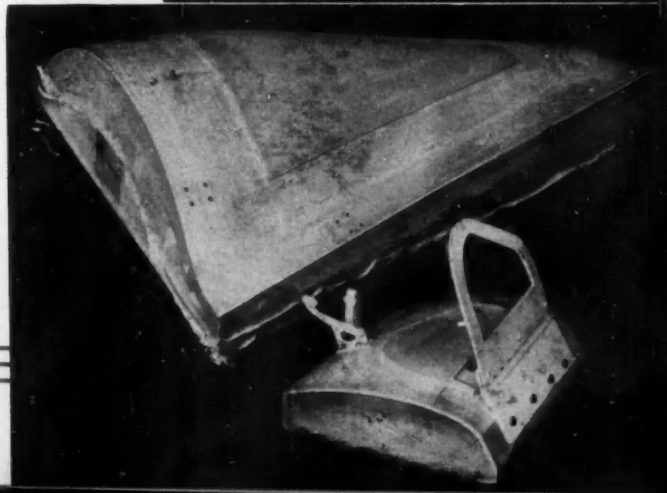


Fig. 2—Thermosetting cast phenolic resin contoured dies used for fabricating plastic parts.

Fig. 3—(upper right) Magnesium welding fixture.

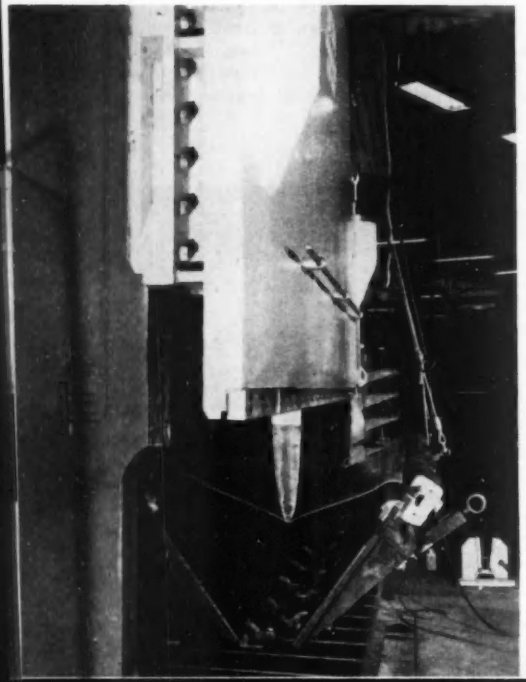
a wider variety of the more complex shapes.

Plastics are being used more and more extensively, not only for light weight aircraft parts but also as a material for limited production and experimental type tooling. Their advantages in tooling are: Their lightness as compared to equally strong or rigid metallic tools; the simplicity of producing plastic tools; the comparatively short labor and shop time involved in plastic tool production; the comparatively low cost of plastic tools for many applications; their stability and strength, that is, their great resistance to dimensional changes; and the fact that excessive abuse is readily detectable. A plastic template if dropped will not bend or distort without noticeable surface dimension changes.

A disadvantage of some types of plastic tools is that they are more easily abraded than metal. This can be compensated for by metallic facings of thin sheet metal on areas subject to great wear.

Fig. 1 shows a strut fairing made from laminated glass fiber cloth plastics. The lower half shows drill and trim templates made by the same process with actual parts shown partially nested in the box templates to indicate the relation of template to part. In the examples shown, the actual parts are also of plastic and glass fiber. However, plastic templates may also be used for metallic parts. This type tool is produced by laying glass fiber cloth over a part or die, impregnating each layer of glass fiber cloth with a polyester resin, covering with a pressure bag when necessary, and allowing to air harden. The cold method of curing is used more extensively at Northrop than heat curing methods so as to prevent warpage during curing. After curing, the laminated glass fiber plastic template is removed, drill bushings are attached for drilling, edges are cut to the desired trim line, and metal facings are added, if necessary. This type of laminated glass fiber plastic is now being used also for assembly trim and drill templates and welding fixtures, and new uses will no doubt be found by extension of its current use.

The contoured dies shown in Fig. 2 are thermosetting cast phenolic resin used for fabricating plastic parts. This same type material and same method of making a die may be used to produce pin rotor jigs, holding fixtures, mill fixtures, duplicating masters, matrix molds for Electroform process, postforming dies, trim and drill fixtures, stretch press dies, duplicating patterns, etc. Mechanical properties of dies produced in the



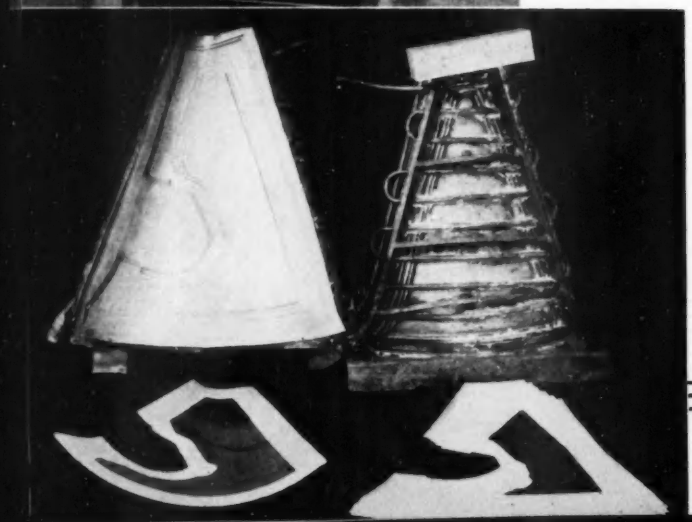


Fig. 4—(upper left) Stretch form die mounted in hydraulically-operated brake of 500-ton capacity.

Fig. 5—Electroform type, light weight, internally heated die.

order of 5000 to 9000 psi uts, 14,000 to 20,000 psi uts and 5000 to 7000 psi shear strength can be obtained. From this brief description it can be seen that we have a very versatile tooling material capable of further "use" expansion.

The use of magnesium for jigs and fixtures in the welding of aluminum and magnesium parts has reduced warpage problems considerably. (See Fig. 3.) Steel jigs and fixtures were standard for years, however, when welding aluminum and magnesium in these steel jigs a certain amount of warpage of the parts occurred. This warpage was found to be caused by the difference in thermal expansion between the steel jigs and the aluminum or magnesium part during preheating and welding. The result was that the parts were under compression stress in areas held by steel jigs and if the stress was severe enough permanent deformation occured.

Currently magnesium is replacing steel in welding jigs and fixtures. Steel is used only in restricted areas to give strength, rigidity and stability against jig warpage. As a result, warpage problems have been greatly reduced and the general utility of aluminum and magnesium welded parts increased. In connection with warpage it might also be asked, "What can be done about eliminating warpage during the strain-relieving treatment which is given every aluminum and magnesium welded part?" Warpage is prevented during strain-relieving at Northrop by leaving the welded parts in their jigs during the strain-relieving heat treatment, whenever possible.

Another question that may occur is, "Why is magnesium and not aluminum used in welding fixtures and jigs?" The primary reason is that magnesium is easier and less costly to fabricate. Coupled with this is also the fact that the expansion characteristics of aluminum and magnesium are very similar, thus allowing the use of magnesium fixtures and jigs in the welding of both aluminum and magnesium parts.

The trend of forming equipment is to hydraulically operated brakes. Mechanical brakes for bending and punching sheet metal have been used at Northrop for many years. However, the hydraulically operated brake of 500 ton capacity used with the stretch form die shown in Fig. 4 is much larger, has greater versatility in use, and a quicker and more responsive operating cycle than the mechanical brakes.

The use to which this hydraulic brake is being put also demonstrates the need for such powerful equipment. A stretch form die and gripping fixture which form the 75S aluminum wing elevator and rudder for the leading edges of the F-89 all-weather fighter are shown in Fig. 4. The sheet formed is of tapered thickness from about 0.081 to 0.156 gage. The elevator and rudder leading edges were formed in one section and the wings in only three sections. Forming by this method gave a saving over forming on a mechanical brake, i.e., approximating the contour by a series of bends along the contour with regular bending punch and die, of around $60,000 for 100 ship sets of parts. This is the most obvious but not the only saving. By being able to design the leading edges with a reduced number of joints engineering design problems were simplified, the number of joints and fasteners reduced, a weight savings introduced, and overall fabrication and assembly time decreased.

The press action and stroke of stretch form die, of course, are vertical. The sheet to be formed is inserted in the clamping jaws, air pressure applied to the pneumatic jaws, and the stretch form die (punch) lowered until it is in contact with sheet.

The stretch form die is lowered and the sheet clamping and holding fixture is brought up (Note: the fixture has a hinge joint at press bed), until the sheet is snug against the sides of the stretch form die. The stretch forming cycle then starts. Microstops are set on the hydraulic brake to limit and control the amount of stretch forming. A 5-6 per cent stretch is being used in forming 75S A.Q. tapered sheet. By pressing a button the hydraulic press performs the required forming stroke and returns the stretch form block to some preset position for easy removal of the part.

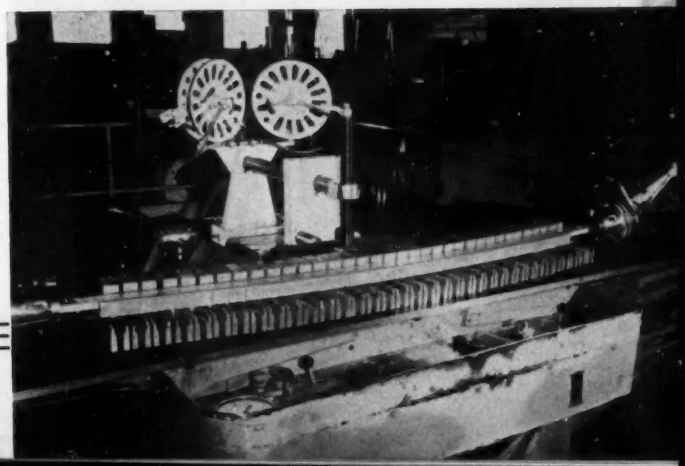


Fig. 6—Flexible stretch form block developed at Northrop for stretch forming of extrusions.

Another tool and recent North American development for fabrication of plastic aircraft parts is the Electroform method, shown in Fig. 5. Essentially, Electroforming is a process for plating thick and strong layers of metals or alloys. The application shown is a strong, internally heated, light weight, low mass, high thermal conductivity die. The die consists of a thick plate of nickel or nickel and copper to give the thermal conductivity. This plating is done directly over a phenolic cast resin pattern which is covered with a suitable conductively adherent film to allow uniform plating. After plating to a thickness to give the desired strength, the slat is removed from the plastic pattern, reinforcing members to give it the desired rigidity are welded to back of plate, copper tubing is coiled flat against the back of plate, metal spray is used to attach and give good thermal conductivity between tubes and plate, and the die is then essentially ready for use.

This method can be used to fabricate plastic parts of the same kind and type as can be formed on phenolic cast resin dies. The difference in use of the two lies in the number of plastic parts to be fabricated. The cast phenolic resin dies require a longer fabricating cycle than Electroform dies. The die cost for the cast phenolic dies, however, is much less than for the Electroform dies. Therefore, the cast phenolic resin dies are of the greatest advantage for experimental and short production runs of a given part (up to about a 50 part run). When the total quantity of a given production part is as large as 500-1000, then the Electroform may be applicable, since the cost of the die when depreciated over a large number of parts is small as compared to fabrication time and cost savings obtained.

In Fig. 6 is shown another recent forming tool development that is typical of the trend in limited production tools adaptable to comparatively short runs of parts with a rapid conversion from production of one part to another. The flexible stretch form block shown in the illustration is for the contour forming of extrusions and preformed sheet or plate sections of similar shapes. In its present stage of development this method is particularly adapted for and is being used almost exclusively to form contours common to the wing and empennage curve or to the longitudinal curve of the fuselage.

Previously a stretch form block of aluminum alloy, zinc alloy, etc., was required for each individual part to be formed. With the current method one flexible cavity snake is required for each shape and size of extrusion or formed section but can be used over and over again for any contour of part with a radius of 50 in. or over. This snake is cast from cerro-matrix (low melting alloy) in one section using a straight length of the actual extrusion or formed section during casting to produce the desired cavity. This long casting is then cut into segments sufficiently short to produce the desired contour within the tolerances required.

For example, a two in. segment will produce contour of radii 100 in. or greater within ± 0.005 in. of the desired contour. Before use the segments are connected to each other by two long coil springs to permit the desired flexibility and ease of handling.

In addition, one set of adjustable angle blocks and one base plate for all extrusions and formed sections of two in. area or less are needed to complete the tooling.

In practice, the adjustable angle blocks are adjusted to the desired length and contour with a suitable template, the flexible snake positioned with the cavity up or outward, depending on plane of contour required with respect to extrusion cross-sectional shape, the straight extrusion or formed section placed in cavity of flexible snake and gripped by the stretch jaws, and then the forming cycle is started.

With World War II, a new metal working tool was introduced known as the Hufford Stretch-Wrap forming machine. It was used by a few aircraft manufacturers at that time, but since has become a necessity in all shops where parts, sheet and extru-

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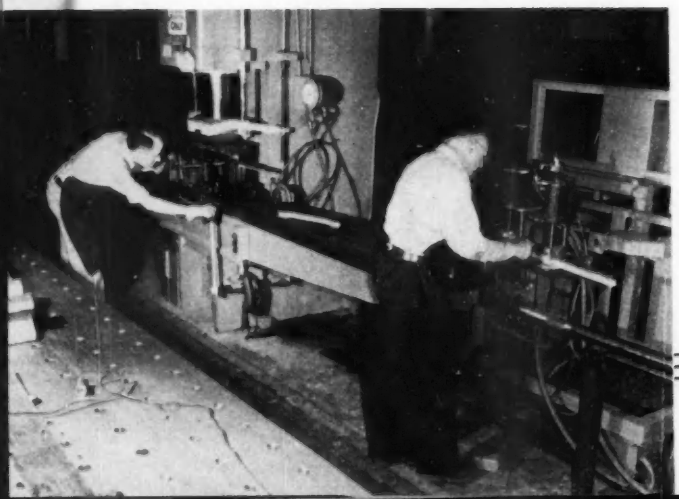


Fig. 7—Equipment used in the hot forming of aluminum extrusions.

SAE Annual Aeronautic Meeting

ALONG with the staging of a large aeronautical engineering display and flight demonstration of modern aircraft, the Society of Automotive Engineers held its 1951 National Aeronautic Meeting in New York City last month. A feature of the meeting, which leaned toward commercial aircraft design and operation, was the annual presentation of the Wright Brothers Medal to James C. Floyd, of A. V. Roe Canada, Ltd. Since the recipient is a Canadian, it marked the first time that the honor has gone to a citizen of a country other than the United States. He received the medal for his excellent paper, "The Avro C-102 Jetliner," which was presented at the 1950 SAE Annual Meeting. At the dinner where the award was given, H. Mansfield Horner, president, United Aircraft Corp., was the principal speaker.

Some 80 companies exhibited a multiplicity of products at the engineering display. More than 20 aircraft, ranging in size from small personal planes to the largest military and commercial aircraft, were on view at the New York International Airport, where a number of the newer types were demonstrated in flight.

In addition to these outstanding events, there was much interest in the three-day technical sessions. An innovation this year was an all-day panel devoted to the analization of problems concerning local service lines.

Following are abstracts and/or extracts of some of the papers that were read at this year's meeting.

Turbosuperchargers in Commercial Aviation

By A. W. White,
E. O. Hendrickson,
and F. W. Fernald
Aircraft Gas Turbine Div.
General Electric Co.

THE present powerplant in the Boeing Stratocruiser uses a turbo in conjunction with a geared or internal supercharger as shown in Fig. 1. The latest step in turbosupercharged powerplants is an arrangement in which the turbo supplies all of the supercharging required by the engine and the geared supercharger is eliminated. This powerplant is shown in Fig. 2 and is labeled "completely" turbosupercharged to distinguish it from those powerplants in which the turbo supplies only part of the supercharging and the geared supercharger the balance.

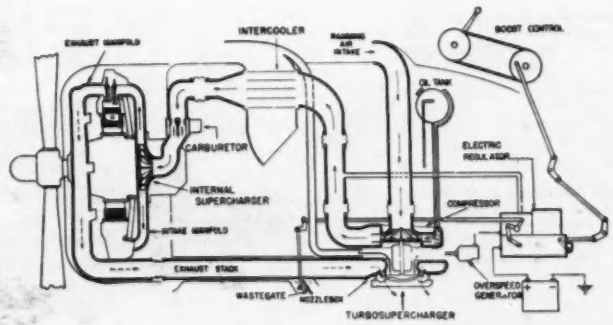


Fig. 1—This is a schematic diagram of the turbosupercharged powerplant that is presently being used in the Boeing Stratocruiser.

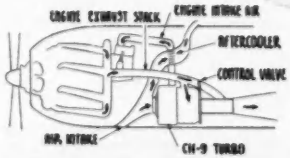


Fig. 2—In this proposed arrangement of a turbosupercharged powerplant, the turbo supplies all of the supercharging required by the engine and the geared turbine is eliminated.

By eliminating the geared supercharger, three important advantages are obtained:

(1) The 500 hp normally required to drive the geared supercharger can now be applied in the new powerplant to propelling the airplane.

(2) The temperature of the air to the engine cylinders is reduced approximately 200 F, since there is no further compression of the air after it has passed through the air cooler. This temperature reduction permits raising the cylinder pressure or packing more air into the cylinders at the lower temperature and, therefore, raises the power output of each cylinder. It was the design of cylinders and other engine parts which were capable of handling this higher pressure that made the new powerplant possible.

(3) The exhaust gas energy is now used to much better advantage. In the present powerplant, shown in Fig. 1, the geared supercharger, at cruising conditions, limits the airflow to the engines due to low engine speed. Since the air output of the turbo is thus limited, only a small portion of the available exhaust gas is used to turn the turbo and a large part of the exhaust energy is dumped through the wastepipe.

The new powerplant has been con-

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West Germany Holds Largest

Special Dispatch to AUTOMOTIVE INDUSTRIES

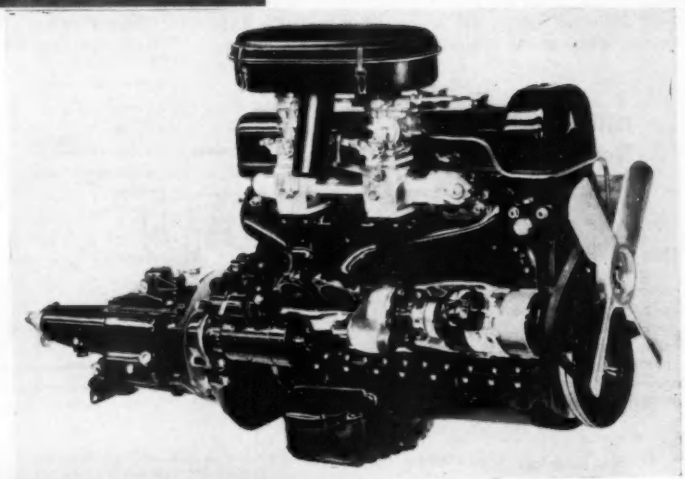
FRANKFURT, GERMANY

WEST Germany's first postwar International Automobile Show, held at Frankfurt last month, and closing April 29, featured exhibits of manufacturers in nine European and American countries. A total of 537 firms made this the largest show to be held in Germany since World War II, ranking it with the most important events of its kind in Europe.

Naturally, interest centered on the latest German cars which, in general, are small in size and designed for high gas mileage. American makes were fully represented and attracted



(Above) In appearance, the Mercedes 300 follows American design as shown in this view. Wide World photo.



(Right) Power plant of the Mercedes Model 300. Note the two carburetors and two separate exhaust manifolds of this three liter, overhead-valve engine.



(Left) This is the Partner model, two-door, five-passenger sedan exhibited by the German Hanomag Co. Wide World photo.

(Right) New BMW 501 sedan. Production of this car is scheduled to start early next year. Wide World Photo.

Show

their share of visitors, although similar models are found in large numbers on the roads throughout the American zone of Germany.

Much interest was shown in the new Mercedes Model 300 which is powered by a 115 hp, six cylinder overhead valve engine. Its streamlined body shows the influence of American design. The price, approximately $5000, puts the Model 300 beyond the reach of most Germans.

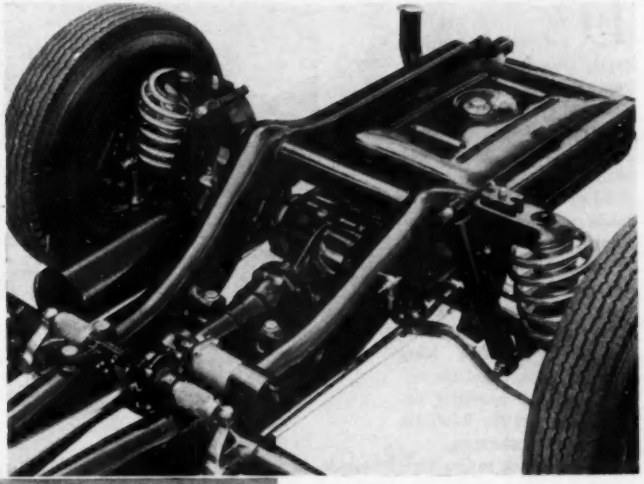
Borgward presented the redesigned Hansa 1800, a roomy car with a four-cylinder engine. The recently-built Porsche, a small, fast car named for the designer of the Volkswagen, was offered in two body types —sedan and convertible. The Goliath 700 was equipped with a fuel injection system for gasoline, thus eliminating the conventional carburetor. A new small car, the Partner, was shown by the German Hanomag Co. It has a 28-hp, three-cylinder engine, and front wheel drive.

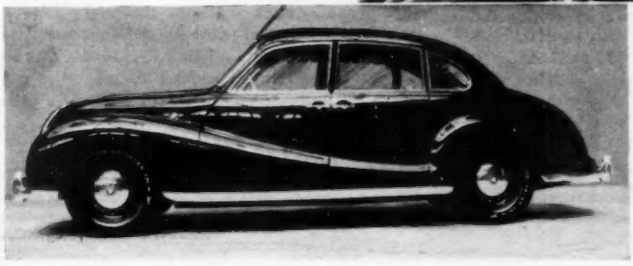
DKW had the only station wagon type of vehicle at the show. BMW displayed a prototype of its first postwar model, a six-passenger car with a 60-hp engine. The Volkswagens were practically unchanged in general design, but had more attractive interiors and better accessories. General Motors

(*Turn to page* 136, *please*)

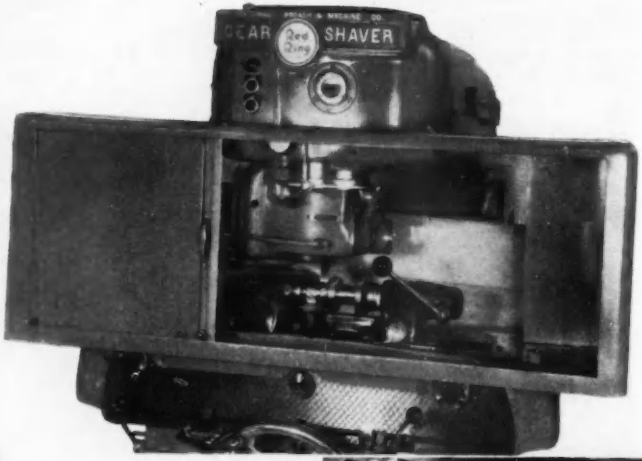


(Above) One of the many pavilions at the exhibition. Acme photo.





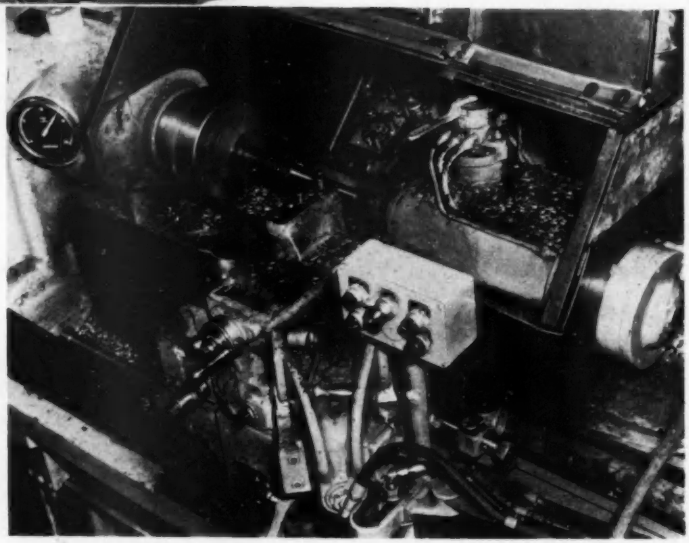
(Above) Coil springs of the rear suspension of the Mercedes Model 300 are supplemented by torsion bars. Adjustment of these torsion bars can be changed to suit driving conditions or load by means of a push-button controlled electric motor.



Gears

By H. S. Gist
Master Mechanic,
Nash Motor Division
Nash-Kelvinator Corp.

Close-up (with guard open) of Red Ring gear finisher with circular cutter for crown-shaving Nash transmission gears. Shown in this view is the shaving of a countershaft cluster gear.



Seen here is one of the operations on the transmission main shaft. One-half of the shaft is being finish-turned, in one setting, from the full diameter bar. This view gives some impression of the enormous rate of metal removal with the single-point carbide tool. This operation is performed in one of the Monarch Mono-Matics, equipped with automatic tracer control.

DURING the past two years Nash has been producing synchro-mesh transmissions of exceptional quality for the Statesman model. Although quietness has been the major objective, a partnership of engineering and production activities has made possible an important improvement in durability as well. These results have been achieved by virtue of some interesting modifications in gear tooth form, application of Red Ring crown shaving, and the development of specially designed cutters for hobbing, shaping, and shaving.

Behind these major developments is a program of quality control which has been projected into every operation in the transmission department, starting with the basic materials. The quality control methods, coupled with new cutting tools, have made it possible to produce transmissions of exceptional quality without relying upon entirely new machinery.

Quality control starts with the material specification, gear steels being checked at the source by the metallurgical department. Similarly, forging practice is held under careful control to assure proper metal density, development of grain flow, and close

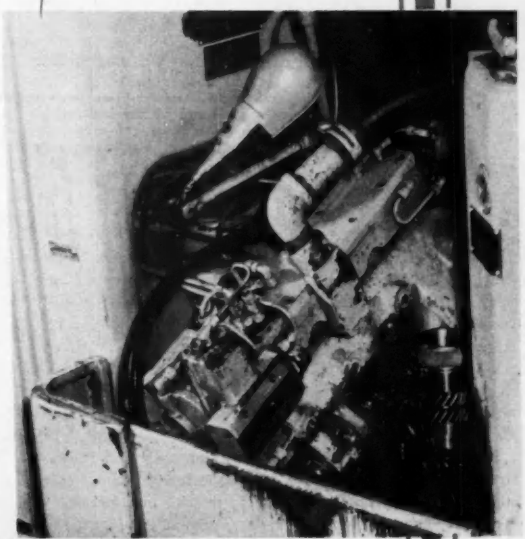
of Exceptional Quality

Improved Tooth Form and Special Production Methods Combined by Nash in Manufacturing Transmissions

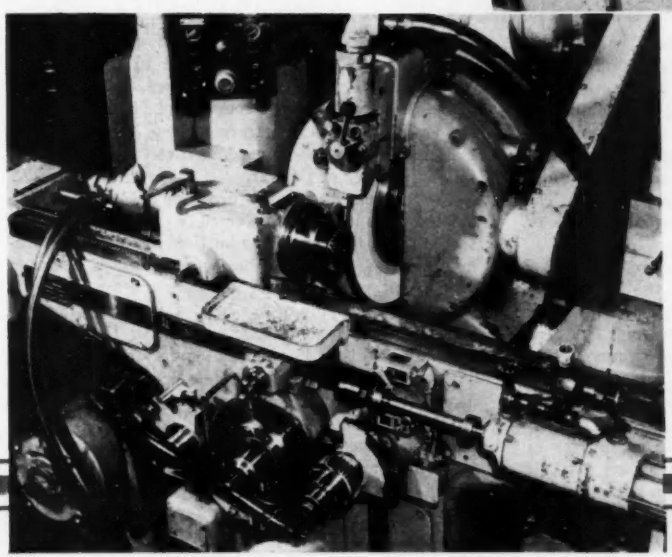
control of forging temperature. Heat treatment of machined parts also is subject to control. All heat treating is done in modern controlled atmosphere furnaces with emphasis on maintaining furnace temperature within close limits and accurate timing of furnace cycles.

Gear tooth modification and crown shaving, which contribute largely to the results achieved here, are translated in practice through the use of Barber-Colman hobs of special design, Fellow's shaper cutters of special design, and specially designed circular shaving cutters for Red Ring crown-shaving machines. Several Barber-Colman vertical gear hobbers of late design, used on some of the gears, make it possible to employ triple-lead hobs to speed productivity materially.

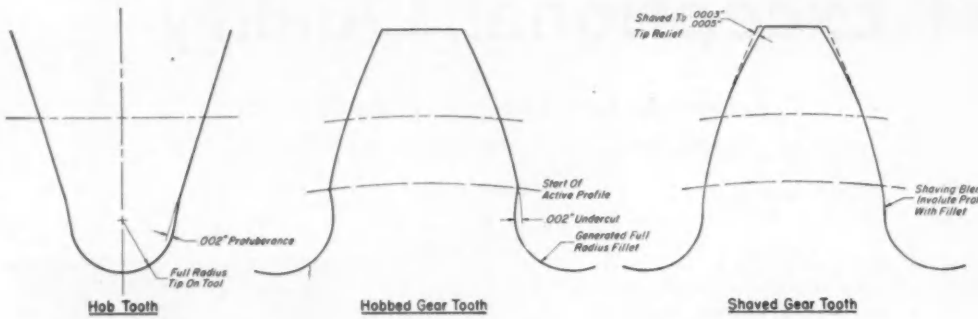
Finally, quality control is assured by the adoption of inspection methods designed to



Above is a view of the work-station at one of the heavy duty vertical Barber - Coleman gear hobbers for cutting transmission gears.



J & L thread grinder modified to serve as a form-grinder is setup for finish-grinding the groove in the sliding gear. A special formed wheel performs the operation with a single plunge cut.



This drawing outlines the elements of gear tooth modification described in the text. The view at the left represents the hob tooth with protuberance and full tip radius. The center view shows a hobbed gear tooth with undercut and full fillet radius generated by the hob. The view at the right shows a shaved gear tooth with fillet-involute blend and tip relief.

give "master" gear quality. Basic control stems from the gear laboratory which is equipped for inspecting gear cutting and shaving tools, and for making regular sampling inspection of production gears to verify and approve each new set-up. On helical gears, lead is checked by means of Red Ring lead checking machine; involute form is verified on an Illinois inspection machine; while noise is checked in one of the new Red Ring gear speeders.

It is noteworthy, too, that when sample gears taken from a new setup are to be inspected in the gear laboratory, they must conform to master charts taken directly from the characteristics of the gear cutters and shaving tools.

Supplementing this basic laboratory control are routine inspection methods including sound testing of all gears. Since sound testing is an exacting procedure, only a little additional time is required to select properly matched sets of gears for a transmission assembly. For this purpose, inspected gears are placed on a rack, after acceptance, and mating gears mounted on the same rack in a parallel row. The matched sets then are kept together for purposes of final assembly.

The modifications in tooth design are of unusual interest since they combine some of the latest principles known to the art. In the first place, all gears are shaved on Red Ring gear finishers and one gear of each pair is crown-shaved (elliptoid form). The amount of crown-shaving is 0.0004 in. per side.

Another outstanding feature, employed by Nash, is the development of a full-radius fillet at the root of all gear teeth in Nash transmissions. As a corollary of this design element, the whole depth of the tooth is only 0.020 in. greater than standard. Adoption of the full-radius fillet has increased the strength of gear teeth materially and gives assurance of freedom from breakage or failure due to unusual loading.

Finally there is a third element of design in the nature of tooth profile modification and also fillet relief aimed at facilitating the crown-shaving operation. This amounts to a "protuberance" undercut of 0.002 in. on the flank of the gear tooth from the radius to the start of the active profile.

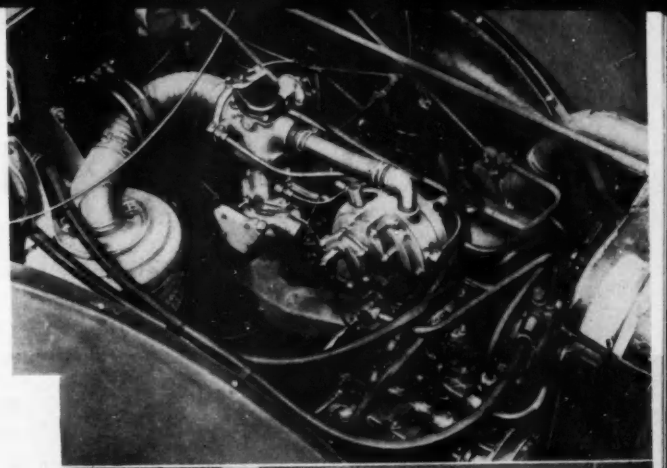
The combination of these special design features results in unusually quiet gear trains, free from edge loading of gear teeth under unusual load conditions which may cause momentary shaft deflection, and durability of salutary character.

Coming to the details of some selected parts, it is of interest to comment on the machining of the transmission main shaft. Made from NE 8620 bar stock, it is chamfered and cut to length in a Cone four-spindle cut-off machine, then centered. The most impressive operation is the rough- and finish-turning of the entire shaft in a battery of two Monarch Monomatic lathes the job being done directly from the full rough diameter of the bar.

The first machine finish-turns one half of the shaft, and the work is then transferred to the second machine for finishing the remaining portion. Typical of Monomatic cycles, each machine is fitted with a tracer attachment working from flat steel master templates mounted on the side of the bed. Cutting is done dry and is extraordinary in many respects. For example, spindle speed is 1249 rpm and surface speed 544 fpm with a feed of 14 in. per minute. Depth of cut is quite heavy—ranging from a maximum of 7/16 in. to a minimum of ⅛ in. As is well known, a feature of these machines is the use of a single point carbide tool which makes for extreme flexibility of set-up.

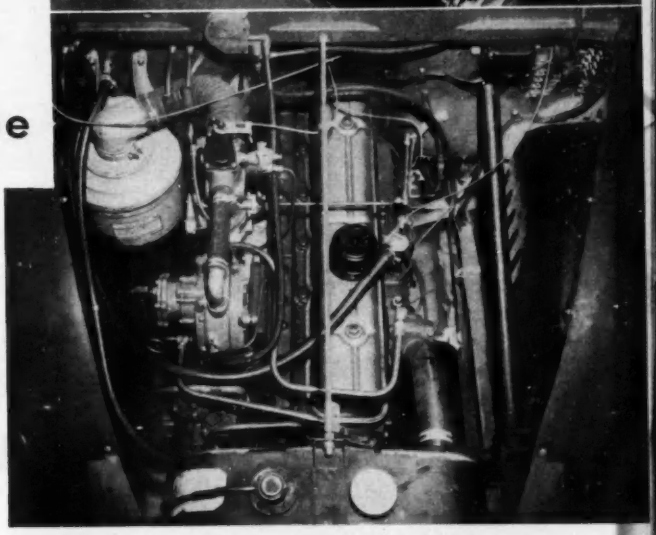
The low and reverse sliding gear has been selected as an example of a single face gear of some

(*Turn to page* 112, *please*)



Installation and arrangement of LPG accessories on the Reo OA engine. In the center, above the intake manifold is the mixing valve, connected at the rear to the air cleaner, at the front to the Ensign regulator valve. The latter has just a single fuel connection, and hose connections leading to the water pump in front for hot water jacketing.

LPG Conversion System for Reo Gold Comet Engine



Top view of engine compartment showing the mixing valve to the rear, the regulator valve in front.

REO MOTORS, INC., is developing a liquefied petroleum gas conversion system for the OA Gold Comet engine, primarily for truck installation. Proved by dynamometer and field testing this conversion will soon be available either factory-installed on new vehicles or in the form of a complete kit suitable for engines now in service.

Readers of this publication are familiar with the objectives and advantages of LPG operation, the subject having been appraised from an engineering standpoint in an article "The Economics of Propane as an Engine Fuel," by A. T. Browne in AUTOMOTIVE INDUSTRIES, Feb. 15, 1951.

The Reo conversion has been designed with a view to maximum simplification of components and plumbing. As illustrated, the installation is indeed free from complication, and differs only slightly from the standard gasoline engine set-up to the eye.

In the first place, certain basic changes are made to obtain a compression ratio of 8.3 to 1. New pistons and a "military" cylinder head are installed. The pistons have a flat head instead of the concave head used in the standard gasoline engine, and the distance from the piston pin to the top of the piston has been suitably increased.

Because successful engine operation when burning LPG depends upon an induction system free from hot spots and adequately cooled, manifolding is entirely new for LPG conversion. The principal change is found in a complete divorce of intake and exhaust manifolds, eliminating the connection between the manifolds as it exists in the standard engine. Thus new manifolds are required for this purpose.

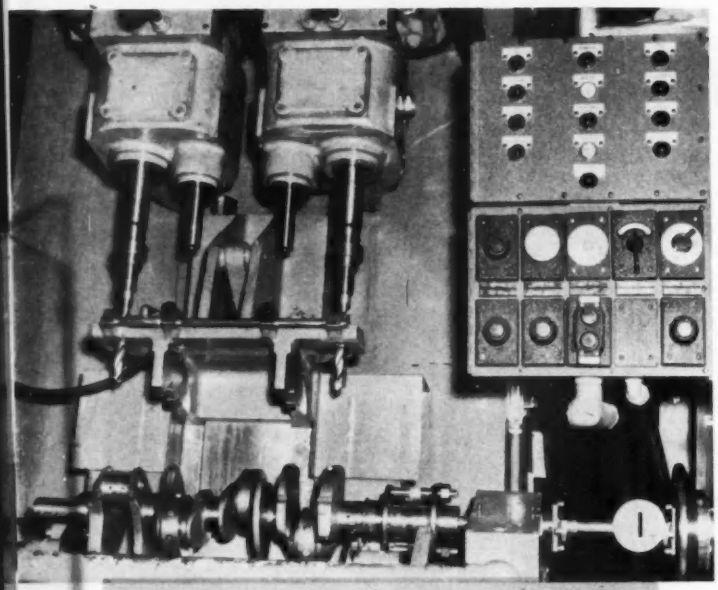
Replacing the usual carburetor is a special mixing valve and an Ensign regulator valve mounted at the front end of the engine on the right hand side. Since the regulator functions as a controlled expansion valve, severe icing incident to the drastic temperature drop within the valve is eliminated to all practical purposes by means of water-jacketing which circulates the heated engine cooling system fluid by connections directly from the water pump.

As is well known, LPG fuel must be stored in Underwriter-approved high pressure tanks in liquid form under a maximum pressure of 200 psi. Consequently, the standard gasoline tanks are replaced by special pressure storage tanks. These tanks constitute another element of the conversion system. In practice, the fuel tanks are refilled at service stations by pumping the fuel in liquid form through a hose connection which is attached to the fill valve on the

(*Turn to page* 146, *please*)

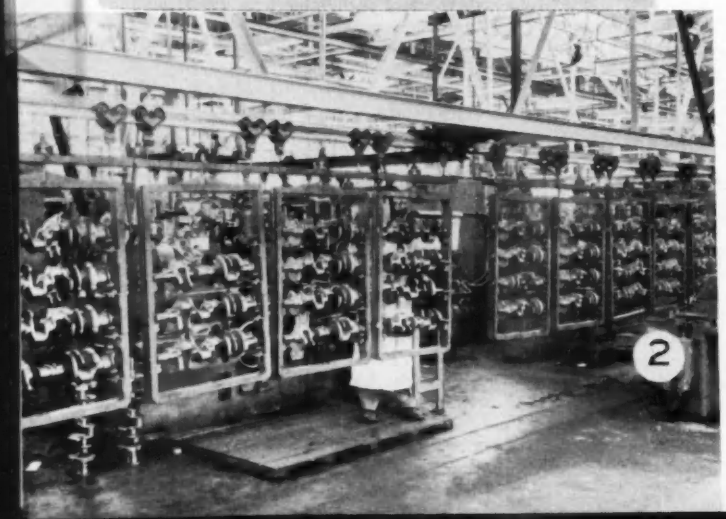
Chrysler V-8 Pistons, Rods

By Joseph Geschelin



1. *Crankshafts are balanced in a combination balancing and drilling machine, the balancing station being at the extreme right out of this view. The electronic unit at the balancing station automatically sets the drilling spindle stops for removal of the correct amount of metal.*

2. *The large carriers, holding four V-8 crankshafts, traverse the the entire crankshaft machining line on the heavy duty monorail conveyor.*



FACILITIES for producing Chrysler V-8 engines not only incorporate the latest types of machine tools and methods but emphasize a number of outstanding "firsts" in the form of techniques noted for the first time in engine production. The March 1 issue of AUTOMOTIVE INDUSTRIES contained the first article on the manufacture of this engine, primarily concerned with some of the highlights employed in the machining of the cylinder block and heads.

This article describes a sampling of interesting or unusual operations found on the machine lines for the piston, connecting rod, and crankshaft. Among the items of outstanding merit to be mentioned are the electronic gages for automatically gaging and marking a multiplicity of controlling dimensions on the piston and rod; the first example noted by the writer of turning the elliptical piston skirt in a special adaptation of a familiar precision-boring machine; shot-peening of the crankshaft, primarily for treating the undercut fillets on pins and journals to increase durability; and the emergence of a new make of connecting rod balancing machine with electronic brain control of the milling heads.

Consider first the condensed routing for the V-8 piston which is received in the form of an aluminum alloy die casting:

1—Center head, mill weight bosses, drill, chamfer, ream two dowel holes. This is done in a special horizontal drum type combination milling and drilling machine with the pistons mounted with the open end out in a rotary eight-station drum.

2—Rough- and finish-turn ring grooves and chamfer, cut slot, in two set-ups in 8x12 automatic lathes.

3—Rough-bore piston pin hole and chamfer, two at a time, in a two-way horizontal precision-boring machine.

and Crankshafts in Production

New Manufacturing and Inspection Methods Are Employed in Making These Important Parts for the 180-Hp, Overhead-Valve Engine

4—Drill eight oil holes in No. 3 groove in a special tub type drilling machine.

5—Cut lock ring grooves in a special two-way machine.

6—Cam-turn OD of skirt and rough- and finish-bore piston pin holes in a special multi-purpose machine to be described below.

7—Machine to weigh in a special weight balance machine.

8—Wash and tin-plate in an automatic conveyorized plating unit.

It will be recognized that turning of the piston skirt is unique since industry-wide practice employs the familiar cam-grinding technique for this purpose. This change in practice was dictated by the engineering department for several basic reasons. First of all, engineering found it desirable to insist upon the type of finish produced by precision-turning as essential to the proper functioning of the engine. Secondly, the machine, as illustrated, also has horizontal heads for rough- and finish-boring the piston pin hole as a second operation, assuring the proper relationship of critical alignment because both operations are done with the piston located in the same fixture.

The machine, as may be seen, is a special three-way precision-boring unit incorporating a three-position trunnion fixture, each station holding two pistons. Work is located on a spring center and held against the piston head, by three clamps; while correct radial location is obtained with a hinge locator carrying pins which register in holes in the weight bosses.

First operation is to index the work-holding fixture to the two heads in the rear for finish-turning the cam-shaped skirt. The basic diameter at the bottom of the skirt is held to 0.0000-0.0005 in. tolerance.

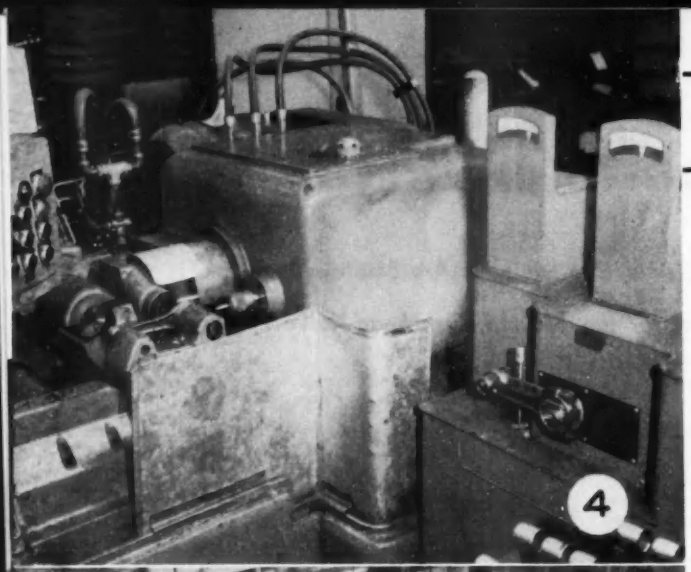
The fixture is then indexed to the second position where the two horizontal heads precision-bore the piston pin holes. These operations are entirely automatic in cycle.

Following machining the pistons are transferred to a monorail conveyor where they are carried in trays to the loading end of the tin-plating unit. Here the feeder conveyor, as shown, runs parallel to the plating conveyor and a special air-operated transfer mechanism alternately picks a tray off the feeder line for transfer to the plating conveyor. It transfers a tray of plated pistons from the plating conveyor to the branch of the feeder conveyor which leads into the piston inspection booth.

Easily one of the most outstanding developments in automatic gaging is the multiple purpose piston gage which is set up in the inspection booth directly adjacent to the feeder conveyor from plating. Not only does it grade piston skirt diameter in six steps of 0.00034 in., but it stamps the symbol on the piston



3. *One corner of the piston inspection booth, showing the new electronic inspection machine described in the text. It checks all dimensions, grades skirt diameter in six steps, stamps the symbol on the piston head, stamps the shift number, and accumulates a running total of pistons sorted in each grade.*



4. *This is the new electronic brain connecting rod balancing machine. The rod is first placed on the weighing station at the right to calculate the amount of metal to be removed at each end. Then it is placed in the work fixture where the pin end is hollow-milled while the cap boss is end-milled according to instructions from the weighing station.*



head, stamps the shift number, and accumulates a running total of pistons sorted in each grade. In addition to the six specified and acceptable grades, the machine will sort over- and undersizes and stamp accordingly for the rejects.

The following criteria are gaged simultaneously:

Pin hole average diameter, both holes, 0.9843-0.9846 in.

Top land diameter—3.7875-3.7925 in.

First and second ring groove diameter—3.377-3.387 in.

Third ring groove diameter—3.389-3.387 in.

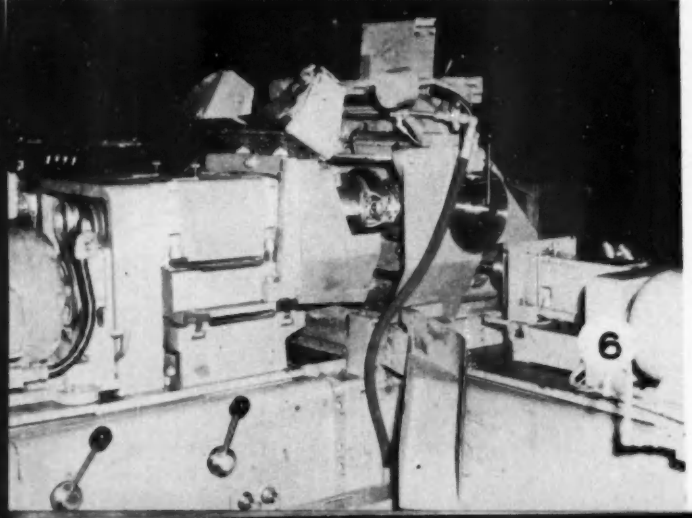
First and second ring groove width—0.080-0.081 in.

Third ring groove width—0.1875-0.1885 in.

Skirt taper—0.0000-0005 in.

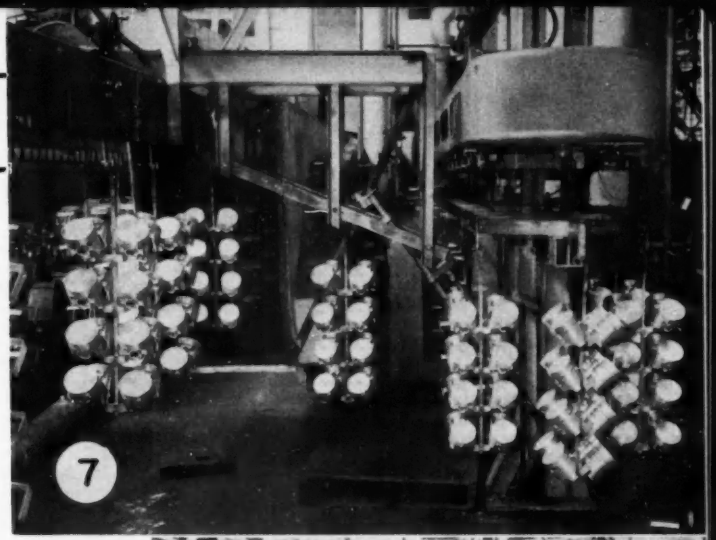
Skirt diameter — 3.81125-3.81330 in. into six classes.

Thus the instrument handles nine basic dimensions, plus six grades on the diameter, plus two rejects for grade, in addition to stamping the symbol, recording



5. *Profile milling of the connecting rod pin end is done in the special four-head milling machine seen here. Each station handles two rods at a time.*

6. *Uncommon feature of V-8 piston machining is the turning of the elliptical skirt in a precision boring machine instead of cam grinding. Shown here is the special three-way precision boring machine in which the skirt is turned at the main station in the center while piston pin holes are bored by the two heads mounted at right angle, one of these being in view at the extreme right.*

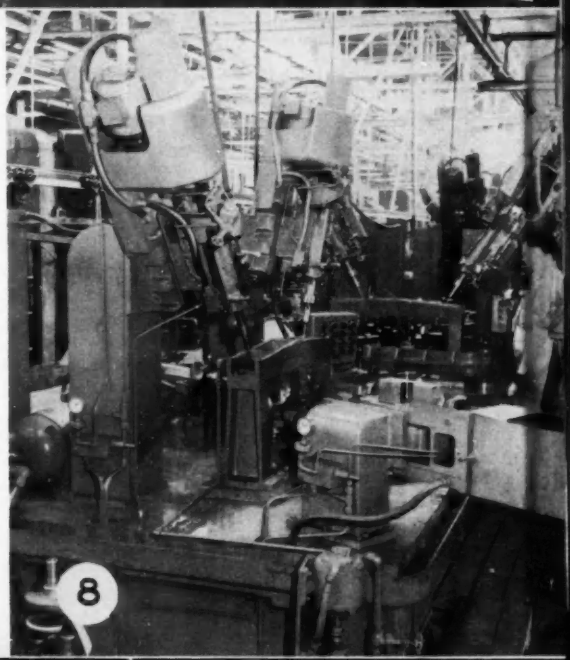


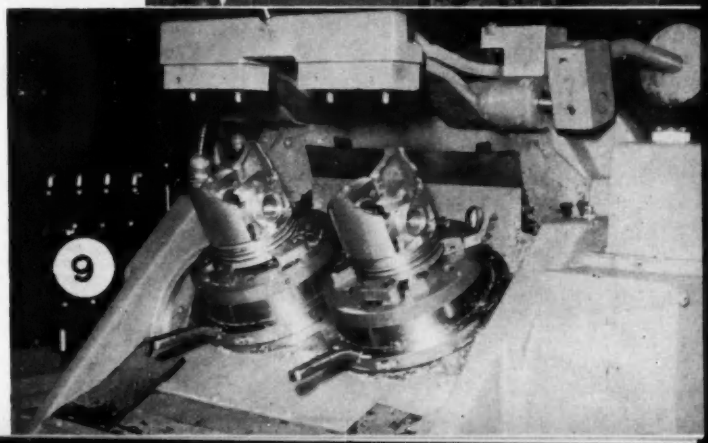
7. *Finish-machined pistons are fed to the tin-plating unit at the right, the process starting in the rear with plated pistons emerging in the foreground. The inclined transfer arm in the foreground picks the load off the plating conveyor and transfers it to the monorail at the left which then transports the pistons to the inspection booth in the rear.*

the shift number, and accumulating a count for each grade.

From the standpoint of the operator, the management of the device naturally is quite simple. The piston is placed in gaging position on the spindle and pushed against a stop, closing a micro-switch. Within the machine circuit the micro-switch closes a relay which starts the time delay relay. Photocell meter pointers then swing to indicate the size or grade of piston skirt. Meanwhile another group of relays comes into action and the photocell meter initiates a relay which "fires" the marker solenoid, the Veeder counter, and the shift number solenoid. Electric counters are automatic in operation, arranged to make one "count" each time a piston is inserted into gaging position.

Moving to the crankshaft department, it is of interest that turning equipment is of the latest type—center drive—in use in the industry. The entire department is threaded by a heavy duty monorail which transports carriers each containing four shafts from machine to machine. The transfer of work to and from the conveyor and the machine is made by overhead hoist. (*Turn to page* 128, *please*)





8. *A battery of oil hole drilling machines is found in the crankshaft department. In addition to the two inclined heads, each unit has a horizontal head at the side and one in the rear. Feature of these machines is the maximum torque control of the drill heads, automatically retracting the drill when it strikes a hard spot.*

9. *Close-up view of the three-way precision boring machine for V-8 pistons, showing two pistons clamped in place on the three-position trunnion fixture. When the cycle start button is pressed this station is indexed into position to the rear.*

NEW EQUIPMENT • PRODUCTION •

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 58

B-66—High Speed Perforating Press

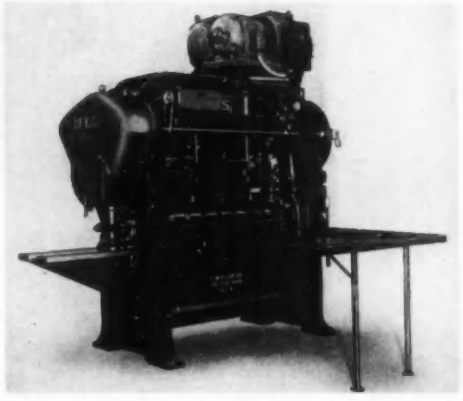
Developed by E. W. Bliss Co., Canton, Ohio, a new 150-ton high-speed perforating press punches slots, rounds or ovals either in straight rows or with alternating rows staggered and operates in a speed range from 100 to 200 spm with a variable speed drive to handle a maximum sheet width of 54 in.

The stagger motion is accomplished by feeding the sheet straight through the press and by moving the punch and die from side to side. The amount of stagger is adjustable. A counter attachment can be set to stop the press automatically after a pre-determined number of rows have been punched. This is declared useful where bank spacings are required. An automatic safety device stops the feed before the tail of the sheet reaches the punching line, leaving any desired margin between the last row of holes and the edge of the sheet.

The precision feeding mechanism consists of entry and exit feed rolls of hardened alloy steel, driven by a feed crank adjustable for different feed increments and different stock thicknesses.

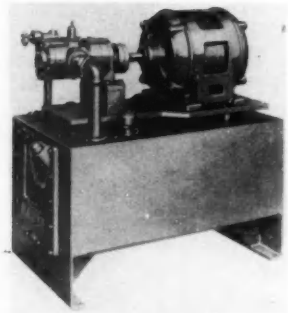
A releasing mechanism, provided for the upper gripping rolls, releases both rolls simultaneously. For easy installation of die sets from the front or back of the press, the feed rolls can be slid on to a support bracket extending to the side of the press. A die can also be inserted through the uprights.

The new 150-ton press is the second in the Bliss series which is being further extended to include 250-ton and 400-ton models. Seventy-five-ton presses were introduced by Bliss in 1947.



Bliss 150-ton high speed perforating press No. 8150.

B-67—Hydraulic Power Unit



Vickers J.I.C. hydraulic power unit.

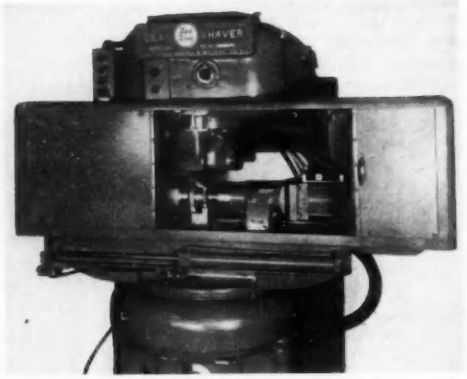
Vickers, Inc., Detroit, Mich., has added a new line of J.I.C. hydraulic power units constructed in entire accordance with recommended J.I.C. Hydraulic Standards for Industrial Equipment.

Features include completely sealed tank, with breather air cleaner and separate filler hole having removable mesh screen and chain-attached cap; elevated tank body with dished bottom, drain plug, and cleanout holes at both ends to permit drainage without spillage and complete cleaning of the tank; and flush type oil level indicator with high and low oil positions marked. Motor mounting plate is separate from tank for convenience in mounting units.

The new units are available in three series, T20, T30 and T60, and 10 models for electric motors from ¾ to 25 hp. Vickers single, double and two-pressure pumps are used for 1000 psi service; Vickers two-stage pumps for 2000 psi.

B-68—Semi-Automatic Gear Loading Device

As a means of increasing the production rate of shaved gears, National Broach & Machine Co., Detroit, Mich., has developed a new means of semi-automatic loading which is applicable to that company's diagonal gear shaving machines. Semi-automatic loading is accomplished by equipping the gear shaving machine with an air-actuated tailstock, the automatic splash guard and a prelocator and stripper which supports the work until it is engaged by the advance of the tailstock.



National Broach & Machine Co. semi - automatic loading for the shaving of gears.

After the operator lays the work gear on the prelocator, he pushes the "start" button. This starts the cycle which follows automatically. The splash doors close, the tailstock advances to engage the work, the coolant flow starts and shaving begins. At the end of the

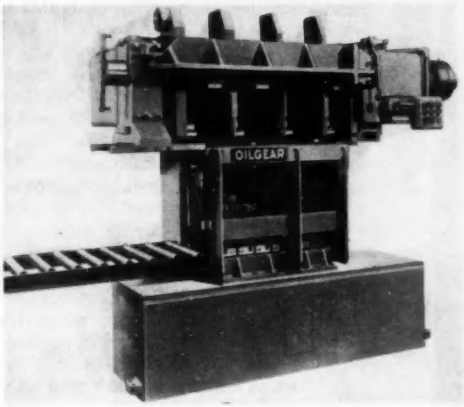
shaving cycle the cutter stops, the coolant flow stops, the tailstock retracts and the splash doors open—all automatically. Thus the operator need merely put the work gear on the prelocator and remove the shaved gear at the end of the cycle.

B-69—Cam Shaft Bushing Assembling Press

In one operation, on the dual-purpose cam shaft bushing assembling press put out by the Oilgear Co. of Milwaukee, Wis., either three or four different sizes of cam shaft bushings are assembled into four or six cyl diesel engine blocks weighing up to 950 lbs. The press is provided with semi-automatic, interlocked, electric-hydraulic control, and alternative manual pushbutton control; variable pressing and return speeds; hydraulic elevator; positive block location; and dual purpose horn (3 or 4 bushings). The operator's work is reduced to the slipping of split bushings on the pins and keeper rings on the bushings, and then guiding the block.

With the selector switch at "auto," semi-automatic operation is started by depressing dual safety pushbuttons. However, until the bushings are in place and the block is in approximate assembling position, the elevator will not raise the block nor operate the main ram. When the block is in position, the hydraulic elevator raises it automatically, locates the pan rail surface over the dowel pins, and holds the block in assembling position. The main ram pulls the bushings home in the block a pre-set distance and pressure reverses the cycle to first return the main ram and then to lower the elevator to the unloading position. The block is then pushed onto the conveyor and another block is moved into the press.

Fluid power is supplied by an Oilgear DX-411 two-way variable delivery pump direct connected to a 3 hp, 1200 rpm electric motor.



Oilgear special 15-ton camshaft bushing, assembling press with engine block in loading position.

B-70—Tonnage Indicator For Forging Press

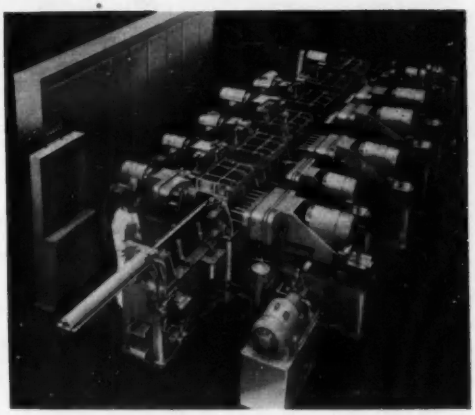


Tonnage indicator (the dial shown above), developed by the National Machinery Co. of Tiffin, Ohio, as standard equipment on the new National Maxipresses, tells how much tonnage a forging requires. Its use is said to permit forging to closer tolerances without danger of overload; afford simpler selection of proper size Maxipres for a given job; and enable faster die set-up. When installed, any variatio.. in press loads gives quicker warning of low heats, improper die set-up, or incorrect die impressions.

B-71—Cylinder Head Drilling Machine

Performing 90 different operations on 100 cylinder heads per hr a new machine tool delivered by the Cross Company, Detroit, Mich., does the work at eight stations.

The part is loaded at the first station. At the second station, 6 rocker arm bracket holes and one water jacket hole are drilled, and 16 stud holes are drilled to one-half of final dept. At station three, four of the stud holes are drilled to final depth, the rocker arm bracket holes are chamfered, two stud holes are reamed as locating holes, and three water jacket holes are drilled. At station four, two oil holes are drilled to one-half depth and the drilling on the remaining 12 stud holes is completed.



Cross machine for drilling cylinder heads.

At station five, nine stud bosses are spot-faced and 12 push rod holes are drilled one-half way. At station six, the two oil holes are drilled to final depth, the rocker arm bracket holes and the first water jacket hole are inspected automatically for depth, and the 12 push rod holes are drilled to final depth. At station seven, six rocker shaft bracket holes and one water jacket hole are tapped. At station eight, the completed cylinder head is unloaded.

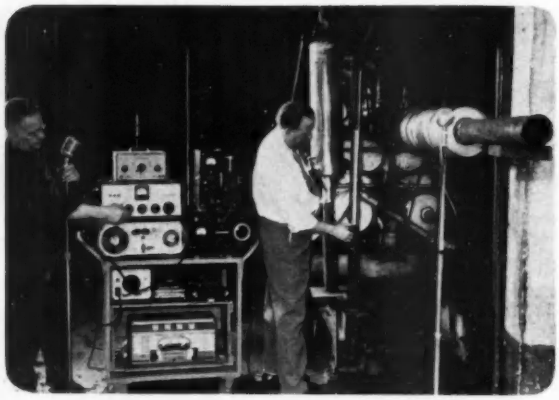
The parts are automatically transferred from station to station. For this reason, the machine joins the line of Transfer-matics which Cross calls its machines equipped with transfer devices.

Clamping is accomplished through hydraulic power. A circulating coolant system cleans and lubricates the taps while they are retracting. An unusual chip conveyor automatically moves chips.

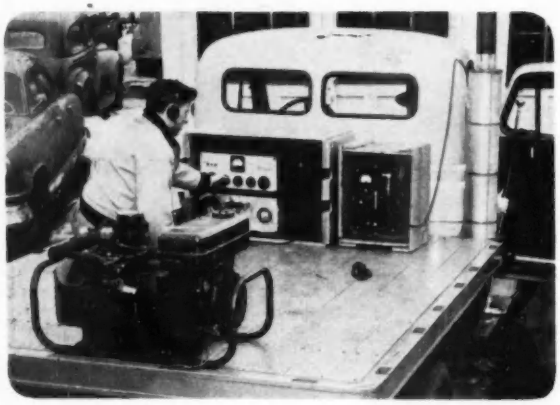
Other provisions include construction to J.I.C. standards, hardened and ground ways, hydraulic feeds and rapid traverse, pre-load spindle bearings, and the use of standard Cross units to facilitate maintenance and provide flexibility for part design changes.

(*Turn to page 72, please*)

Measuring and Recording Muffler Efficiency



Typical laboratory test of an experimental muffler is shown here with the muffler mounted on one half of a Detroit Diesel Twin 671 engine. Microphone at the left is used to record observations on the same tape that is recording sound at the muffler.



Equipment arranged for a road test of an experimental muffler. The tape recorder is shown at the left, sound level meter at the right, and microphone mounted back of open cab door. Shown in the foreground is a 110-volt, engine-driven generator which supplies power for the other units. For test, the truck would carry a prescribed load.

To design and select a muffler that deadens the exhaust noise, or deadens its most objectionable elements, requires first of all an accurate method of measuring the noise. The method must be capable of both measuring the noise during actual road tests and reproducing it faithfully for laboratory analysis.

Such a method has been found by the Donaldson Co., Inc., of St. Paul, Minn. The firm adopted magnetic tape recording and developed a muffler-analyzing method that accomplishes four objectives:

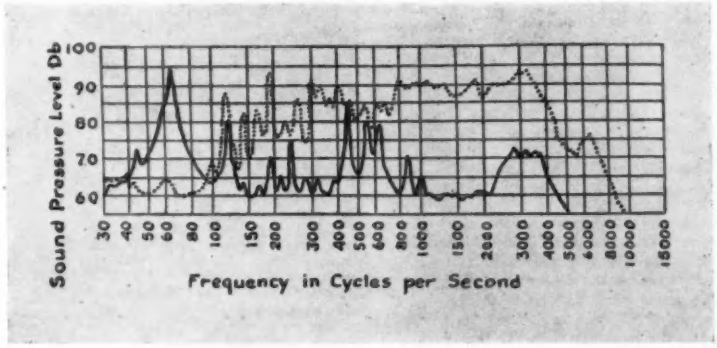
1)—It measures the exhaust noise accurately during road tests, and provides a permanent, audible record of that noise.

2)—It enables the exhaust noise from any one muffler to be compared instantaneously with the noise from any other muffler, at identical loads and speeds.

3)—It enables responsible executives actually to hear that comparison themselves, without leaving their office; it enables them to hear a full week's road tests in less than half an afternoon.

4)—Finally, it enables the exhaust

(*Turn to page* 126, *please*)



This graph is typical of the charts developed from tape recordings of mufflers. It shows the different volumes of sound coming from two different mufflers during the same test.



Here is a picture you helped us to paint

This month of May marks an important milestone in our relationship with you. It's the 50th birthday of our Indiana Harbor works.

Naturally we're a little proud of the growth of "The Harbor" from a sandy wasteland to an efficient steel-making facility. But, more than that, we're grateful to you . . . our customers, suppliers and friends . . . for making the growth possible.

So, without the usual anniversary platitudes, we say sincerely, "Thanks."

(By the way . . . the picture on the right is rapidly becoming obsolete as we further expand our ingot producing facilities by another 20%).



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The BUSINESS PULSE

Irregularity in Wholesale Prices Has Given Way to a Slight Downtrend; Slackening of Consumer Demand During Next Few Months Expected to be Short-Lived; Restrictions on the Use of Numerous Metals Have Been Tightened.

Demand and Prices

The signs of relaxing demand over wide areas of the economy that were first noted about a month ago have become more pronounced in recent weeks. Irregularity in wholesale prices has given way to a moderate downtrend, most marked in livestock, meats, and textile products. The effects of easing demand on industrial operations have been intensified in some cases by official restrictions and shortages of raw materials. To some extent the present tendency appears to be a reaction from the exceptionally rapid inventory accumulation during the last quarter of 1950 and early 1951.

Active forward buying, followed by increasing resistance to high prices and a decline in "scare" buying, seems to have produced an inventory situation regarded in some quarters as possibly foreshadowing a reaction comparable in scope with that of 1949. Such tendencies are most prevalent in markets for nondurable goods, although some consumer durables and industrial supplies also are affected. Rayon mills have reportedly been asked to delay shipments until existing stocks of goods can be moved, and similar conditions are said to exist in markets for woolen and cotton products. Some trade authorities are of the opinion that the current lull in buying is likely to continue for two or three months before accumulations of goods can be worked off.

Unexpectedly small sales of shoes at retail are reported to be affecting markets for hides and leather. The shortages and rising prices of recent months have rather abruptly given way to what is freely described as a buyers' market, with users withholding orders, even though those orders could be placed at less than ceiling prices. Current trade reports indicate a general belief that the situation is likely to continue for a month or more.

Declines in sales of nondurable goods are reflected in markets for the types of paper used in wrapping and packaging. No decrease in output or burdensome inventory accumulation is reported; but buyers are more hesitant, and backlogs of unfilled orders have diminished to some extent.

This Survey Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Automobile Output

Despite some signs of buyer hesitancy, most automobile manufacturers are operating at the highest practicable rates in an effort to anticipate tightening restrictions on materials. Current estimates indicate that final reports for April will show total output at a new seasonal record.

Retail trade in recent weeks has been strongly influenced by seasonal tendencies that cannot be closely gaged because of the shifting dates of Easter in different years. Consumer resistance to high prices does seem to be present in some lines. Charles E. Wilson, Defense Mobilizer, recently stressed the anti-inflationary value of this influence, citing cases in which sellers have been obliged to reduce prices by the refusal of consumers to buy.

A slackening of consumer demand during the next two or three months is officially predicted. The Bureau of Agricultural Economics is of the opinion that signs of a letup have already appeared and that the tendency may continue for a limited time, with some easing of inflationary pressure. This period, however, is expected to be relatively short-lived. Further expansion in Government spending for national defense during the summer, with accompanying reductions in the output of consumer goods, is believed likely to generate new upward pressure on prices. This view seems to be widely shared by private observers, who stress the recent increase in the rate of personal income and the tightening restrictions on civilian output as refuting the view that inventories are excessive or that any sustained recession in demand is likely to occur. For the most part, the lull in buying at the manufacturing, wholesale, and retail level appears to be regarded as primarily a matter of inventory adjustment.

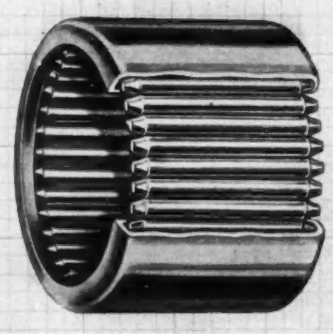
Official Restrictions

Many, if not most, of the recent industrial curtailments and layoffs have been forced by official restric-

(*Turn to page* 134, *please*)

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The ¾-ton 4x4 Dodge Military vehicles shown here are, left to right: M-37 Cargo Carrier with winch but with the tarpaulin removed; the V-41/GT Cable Splicer and Telephone Installation and Maintenance truck; and the M-37 Cargo Carrier without winch but with tarpaulin in place.

Dodge Brings Out Improved Military Vehicles

In launching the new group of Dodge ¾-ton 4 x 4 Military vehicles to be described here, Dodge Div., Chrysler Corp. and the company's engineering department in cooperation with the Armed Forces, have created many major improvements over World War II models designed for similar service. Profiting by the experience gained in producing more than a million civilian trucks and around 450,000 Dodge ¾-ton 4 x 4's in World War II, the design of the current vehicles retains the qualities or ruggedness and dependability but incorporates many new features of outstanding merit.

The new models have four-speed synchromesh transmissions in combination with a two-range transfer case, thus providing increased performance and controllability, particularly for cross-country operations and in heavy mud, sand, or on steep grades. Such performance is further enhanced by the increased wheelbase, better load distribution, and greater ground clearance.

Stemming from past experience bodies have been made better proportioned and are 11-in. narrower, thus affording greater versatility and usefulness. The narrower body permits transportation in landing craft, aircraft, etc., and makes it easier to negotiate narrow bridges and close quarters.

Particular emphasis has been placed on riding comfort, even under the most adverse conditions, with a resultant improvement in safety and reduction in

(*Turn to page* 132, *please*)

Engine Specifications

Model	T-245
Type	L-head
No. cylinders	6
Bore (in.)	3¼
Stroke (in.)	4⅝
Displacement (cu in.)	230.2
Compression ratio	6.7 to 1
Bhp (max.) (without accessories)	94 @ 3200 gov. speed
Torque (max.) (without accessories)	188 lb ft @ 1200
Total weight with accessories	785 lb

Dodge ¾-ton Military Vehicles Condensed Mechanical Specifications

Model	Description	Wheelbase (in.)	Overall Length (in.) (without winch)	Overall Width (in.)	Curb Weight Fully Equipped (lb)
M-37	Cargo Body	112	184¾	73½	5700
M-42	Utility Body	112	184¾	73½	5700
M-43	Ambulance	126	198⅝	74½	7150
V-41	Telephone	126	203⅜	75	6950


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Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

A-126 Lacquer

Hercules Powder Co.—A new release entitled, "The Case For Lacquer in Military Procurement" summarizes the progress made to date on lacquers. It is an aid to the evaluation of nitrocellulose lacquers when various finishes are under consideration.

A-127 Retaining Rings

Waldes Kohinoor, Inc.—A new series of engineering bulletins, Nos. 6, 7 and 8, covering all types of Waldes Truarc retaining rings, grouped by specific ring function, has just been issued.

A-128 Bending Brake

Dreis & Krump Manufacturing Co.—Recently issued is a new catalog P-51, illustrating and describing the complete line of Chicago steel power bending brakes and power universal box and pan brakes.

A-129 Plastic Pipe

American Hard Rubber Co. — Complete engineering data on tubing, pipe, valves and fittings of Ace-Saran and Ace-Parian (polyethylene) plastics are given in a new bulletin.

A-130 Tools

Illinois Tool Works—Availability of a new 44-page, completely illustrated stock list and price list of the company's products has been announced. Wherever applicable, tools listed are in accordance with the latest A.S.A. Standards.

A-131 Chains

Morse Chain Co.—Hy-Vo, a new power transmission drive, is illustrated and described in a new catalog, No. C-72-51. Case histories, installation procedure, ratings, and specifications are provided.

A-132 Fuel Injection Nozzle

Lucas Electrical Services, Inc.—The firm's latest publication, No. 1029, gives full details of the C.A.V.-Ricardo "Pintaux" nozzle for use in the Ricardo type combustion chamber.

A-133 Textured Metal

Rigidized Metals Corp.—Volume 1, No. 1 of a new pamphlet, Rigidized Metals News, that will be published periodically has been announced. It gives up-to-date news of the latest developments of the firm's product.

A-134 SR-4 Gages

Baldwin-Lima-Hamilton Corp.—Price list of SR-4 load and pressure sensitive devices is announced by the corporation. The bulletin gives domestic prices of 18 load cells of three types, 11 pressure cells, and six cantilever force beams.

A-135 Lift Truck Accessories

Towmotor Corp.—Recently published is a new special engineering folder for industrial users of lift trucks who are faced with unusually difficult handling problems.

A-136 Gasoline Survey

E. I. du Pont de Nemours & Co., Inc. —The Petroleum Chemicals Div. of the firm recently released a report, Motor Gasoline Survey, which furnishes current data on antiknock rating and tetraethyl lead content of motor fuels marketed throughout the U. S.

(*Turn to page* 116, *please*)

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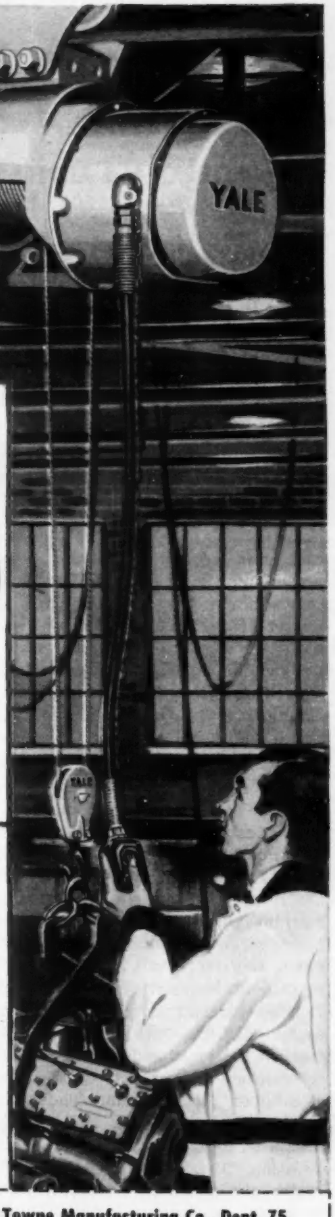
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AIRBRIEFS

By ROBERT McLARREN

Convertaplane Action

For five years the Air Force and Naval Aviation have flirted with the convertaplane, a device that rises and descends vertically like a helicopter but in level flight has the speed of a fixed-wing aircraft. Helicopter designers insisted that they had the technical knowledge to accomplish this seemingly impossible design job but the USAF and Navy Bureau of Aeronautics turned a deaf ear and left only a tiny opening: should a private company develop a successful convertaplane, the services might buy it. Navy's interest, obviously, has long been much stronger than that of the Air Force since the convertaplane is tailor-made for carrier or cargo ship operation. Nearest practical approach was the Vought XF5U-1, which figured briefly, spectacularly but quite wrongly as the "Flying Saucer" a year ago. Featuring a round-shaped wing with two huge propellers projecting forward, it was designed to fly 425 mph in level flight but only 40 mph when tilted up on its nose with its propellers functioning as lifting blades. Only a flying scale model was built.

Now comes the first tangible break in the dam with award of three design study contracts by the Air Force. These call only for engineering drawings and performance calculations but few doubt that construction on one or all will follow within a year. Bell Aircraft Corp. will design a convertaplane in which the rotors tilt through 90 deg. On the ground the machine will look like a conventional airplane with rotors atop the wing. After a vertical takeoff and climb, the rotors will rotate forward into position as propellers. Second type, to be undertaken by McDonnell Aircraft Corp., will be a conventional helicopter with fixed wings, the idea being that as level speed is increased and the rotor begins to lose lift due to compressibility effects on the advancing blade and stalling on the retreating blade, the fixed wing will take up the load. Third type, long-held a dream impractical technically, will be tackled by Sikorsky Aviation Division, United Aircraft Corp. In this design, the blades are retracted in flight and the craft proceeds as a conventional fixed-wing airplane. Sikorsky is even contemplating the use of gas turbine engines. When any one of these three convertaplanes becomes an accomplished fact, assuredly the long-sought "ideal" flying machine will be a reality.

Not-So-Common System

Since the President's declaration of a national emergency last fall, the "Common System" air navigational facilities program has all but come apart at the seams. It will be recalled that this was a joint Air Force, Army, Navy, Commerce program based on the SC-31 report of the Radio Technical Committee for Aeronautics, itself a widely-composite group. First goal was the "interim system," to be in operation by 1955 and target was the "ultimate system" to be ready for use in 1963. Beginning last fall, however, the Air Force started going its own way in the development of aviation electronic equipment; then the Navy began to drift into more complex programs. A few weeks ago the four member-agencies of the Air Navigation Development Board, charged with administration of program research funds, slashed its budget by two-thirds, forcing elimination of all research projects and sustaining only those development items virtually ready for installation. Although some of these cuts have been restored, resignation of ANDB's key scientific personnel has aggravated the situation. Now comes disintegration of the Navigation Panel of the Defense Department's Research and Development Board, which supplied the military end of the ANDB's work, just as the RTCA supplied the civilian end.

Topping off the whole clouded situation is the recent statement by Milton Arnold, technical chief of Air Transport Association, that the airlines now have available just about all the essential aids they need for virtually-perfect schedules. The airlines don't think closing the final gap of, say, two per cent from 98 per cent perfect to perfect would be worth the millions of dollars it would cost. Thus, trouble-in-paradise and end-of-the-line for the "Common System."

Big Things in Aviation

Airplanes for years have been considered pretty frail things by Detroit standards and fairly small items in the national production scheme of things. Recent events point to some astounding figures now peculiar to aviation. General Electric is assembling a drive system for a new NACA wind tunnel (for the testing of tiny models) which will produce no less than 216,000 hp on a single shaft. Normal rating of 180,000 hp still makes this wind-tunnel drive the greatest power ever placed on a single shaft. Now plans are under way for development of a 75,000-ton hydraulic press to be used for press-forging airplane wing parts. This press is still in the future, and is part of a 25-50-75,000-ton press program now under way under Air Force sponsorship. Both of these high-figured projects are designed for the same job; development of supersonic aircraft. The huge wind-tunnel

(*Turn to page* 138, *please*)



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C-106—Contact Wheel for Abrasive Belt

A new type of contact wheel for abrasive belt application on backstand idler applications of many types in the metal-working field is announced by the Carborundum Co., Niagara Falls, N. Y. The new "61" wheel, of specially-serrated rubber, causes a controlled breakdown in the bond of the abrasive belt, so that glazing is reduced, and belt life is reported doubled.

While the idea of a serrated rubber contact wheel is not new, the unique characteristics of the "61" wheel—the relief angle, wide-spaced lands, and narrowness of the lands, which are based largely on the design of milling cutters—are said to be entirely new developments.

In a test in a customer's plant the "61" wheel was applied in the flat surface grinding of auto bumpers prior to forming. Thirty-inch wide belts on Hill-Acme Co. wide-belt surface grinders were used. Previously, it is reported, 300 pieces were obtained per belt. With Carborundum's contact wheel, 600 pieces were obtained, with an increase of 128 per cent in stock removal. Result was radically decreased rejects and a much more consistent finish.



Carborundum "61" contact wheel for abrasive belt application.

In the grinding laboratory of Carborundum's Coated Products Division, comparative tests were made on a belt backstand grinder of all known types of rubber contact wheels. The same belt type—14 ft by 4 in. No. 80 ALO EC M—was used in each case on low-carbon 1015T descaled steel at 7350 sfpm. It was found that the new wheel permitted the removal of 2 to 4½ times the total grams removed with the use of the other wheels.

(*Turn to page 64, please*)

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BORG-WARNER
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SUNICUT 102. Active-sulphur, general-purpose oil for use in automatics working all types of steel, especially high-alloy steels.



SUNICUT 105. Transparent sulphurized cutting oil for heavy-duty jobs like gear cutting, broaching, and threading alloy steels.



SUNICUT 209. Dual-purpose oil for larger automatics working steel, brass, copper. Also hydraulic fluid for chucking machines.

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For more than 35 years The Pierce Governor Company, Inc. of Anderson, Indiana, has excelled in the design, engineering, and production of important parts for the Automotive and Aircraft industries. Today's production features:

Sisson Automatic Chokes

Complete line of precision engineered chokes for the automotive industry—original equipment and replacement parts

Famous Pierce Governors

Pierce centrifugal-mechanical and hydra-mechanical governors for gas, gasoline and Diesel engines—automotive and industrial.

Aircraft Engine Controls

Design and manufacture of precision hydraulic and mechanical fuel control systems for leading aircraft engines

Hydraulic Transmission Controls

Manufacture of sensing mechanisms for hydraulic transmissions

Let Pierce's precision engineered products and manufacturing facilities solve *your problem!* Write . . .

The Pierce Governor Co., Inc.
Anderson, Indiana

PIERCE

NEW PRODUCTS

For additional information please use coupon on page 58

(*Continued from page 62*)

C-107—Transport Carton Sealing Tape

A carton-sealing tape that meets government specifications for both V3 and W cartons has been made nationally available by Minnesota Mining and Mfg. Co., St. Paul, Minn.

The tape—"Scotch" brand acetate fibre tape No. 711—is government-approved for specification No. JAN-P-127, Type 3 & 4, Grade B & C, for sealing V3 cartons; and for specification No. ANT-12A-T2, GA & B for sealing W cartons. It is used for sealing a carton's interliner and outer seams, and for covering and protecting carton labels.

Transparent and 6 mils thick, the tape is resistant to water, shocks and rough handling, the 3M company said,



Minnesota Mining and Mfg. Co. carton-sealing tape, No. 711.

and holds tight in all weather—humid, dry, hot or freezing. It is described as having "exceptional" adhesion to paper. When used over labels, the tape "surpasses government requirements for keeping labels clear and readable in spite of scuffing and smudging," the company explained.

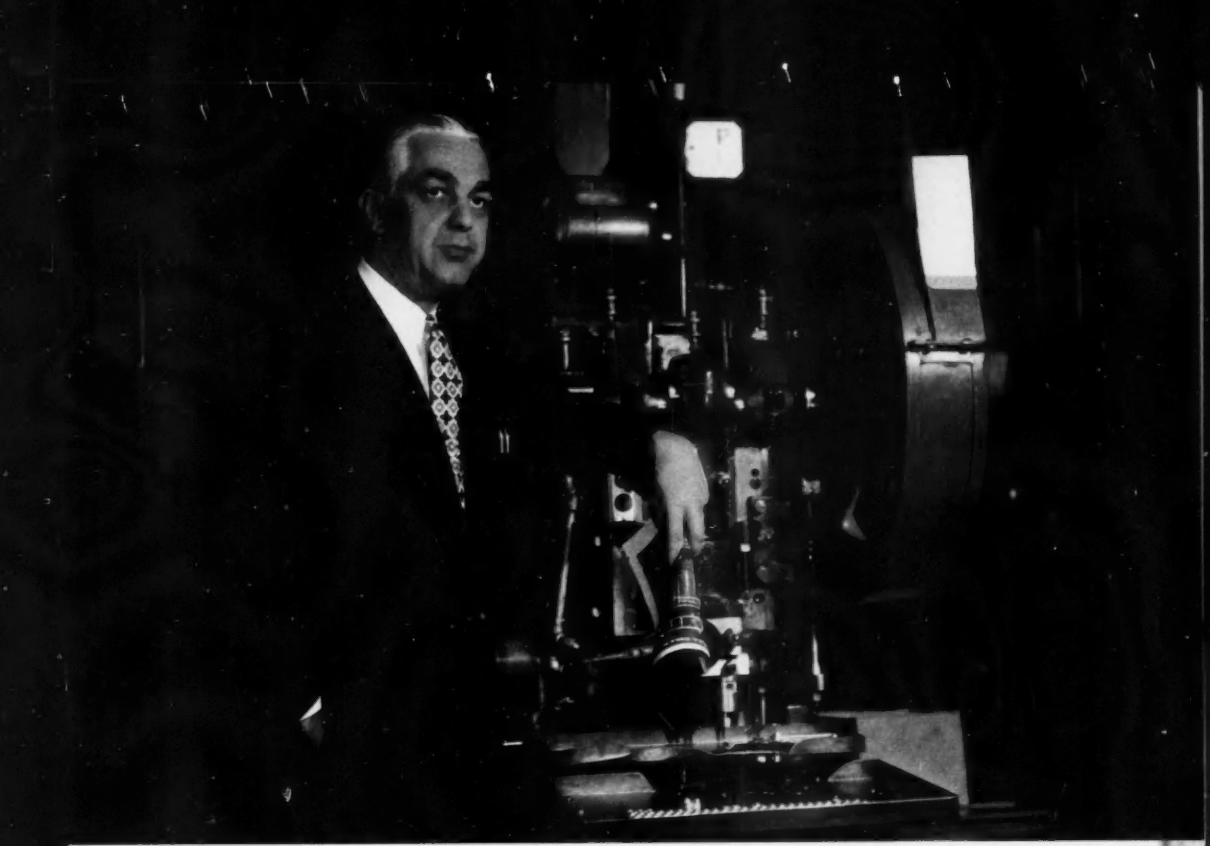
The tape is made in ¼ to 6-in. widths on 72-yd rolls, with wider widths available.

C-108—Radio Frequency Generator

A versatile 5-kw radio-frequency generator for industrial applications where relatively small parts are to be surface hardened, annealed, brazed, or soldered, is available from Westinghouse Electric Corp., Pittsburgh, Pa.

The unit is designed either for production line operation, where parts are fed continuously through the heating coil, or for small-lot operation, handled on a batch basis. A single generator

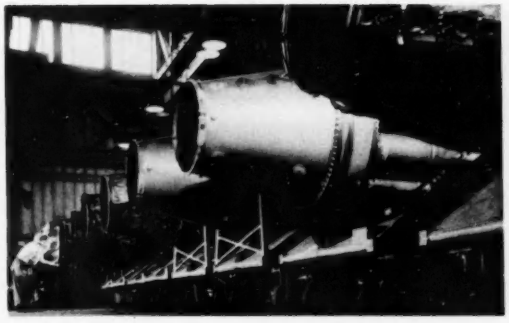
(*Turn to page 69, please*)



FRED A. HOFMANN, production vice president of the Elastic Stop Nut Corporation of America, says, "We're back on a full 2-shift production schedule, and practically every one of the 62 Tri-Clad motors we've installed since 1941 in our plant at Union, N. J., is going night and day. Sure, we make a lot of steel products But for a general-purpose motor, we don't think you can beat cast iron. After the pounding we've given our Tri-Clad motors for the past 10 years, we're stronger than ever for Tri-Clads."

ELASTIC STOP NUT CORPORATION:

"We're stronger than ever for Tri-Clad triple protection!"

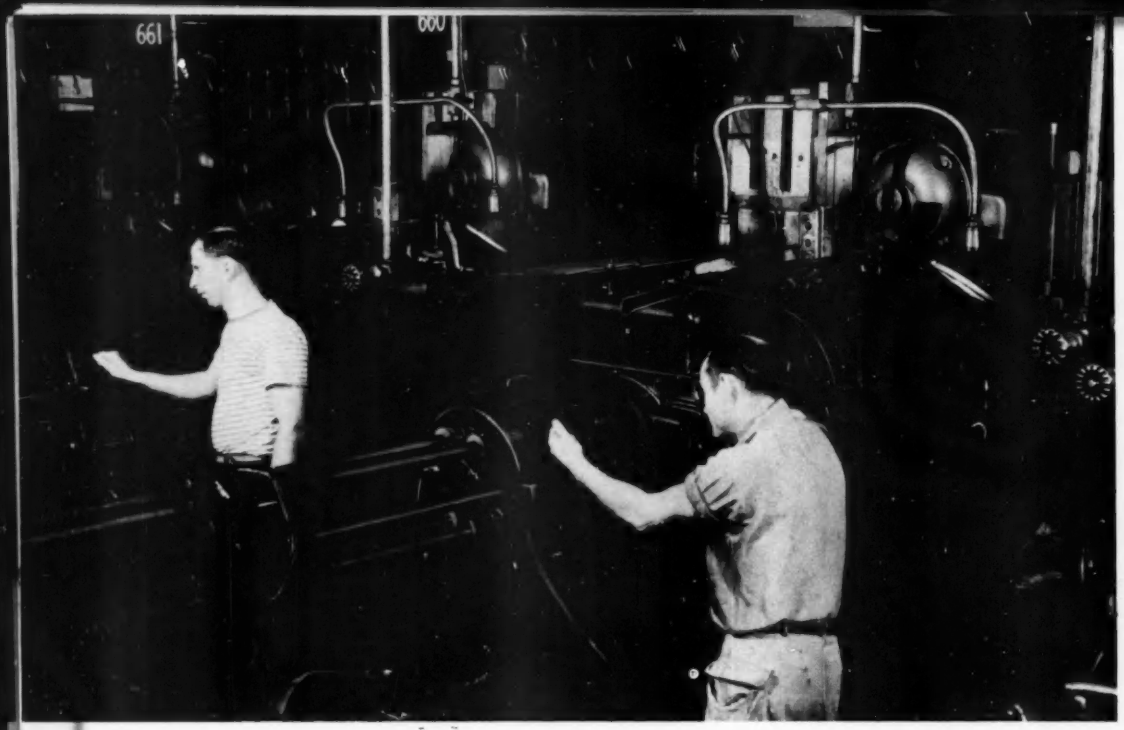


TRI-CLAD MOTORS drive machines that produce ESNA fasteners for use on jet aircraft engines—the engines that power our modern military planes. Each of the jet engines above uses a large number of these special stainless-steel high-temperature nuts, designed to hold under the extreme heat and other severe conditions of jet-engine operation. Moreover, these nuts must be re-usable without seizing or galling the finish. ESNA counts on the reliability of their Tri-Clads to help turn out thousands of these fasteners every day.



VIRILE VETERAN. This 10-hp Tri-Clad motor has been driving an Acme Gridley multiple spindle bar machine for nearly 10 years. It's still going strong, another reason why, after 10 years, ESNA thinks Tri-Clad is still their best motor buy! And today's Tri-Clad motor, all-industry favorite, is better than ever!

GENERAL ELECTRIC



4 STEPS—AND NO HANDS! Backbone of the ESNA production line, the Acme Gridley automatic bar machine (3 shown above) ejects a finished nut blank every 4½ seconds. The operator simply keeps the six spindles supplied with bar stock. The machine feeds stock, machines the nut profile, drills 2 holes and cuts off to accurate lengths. The load on the 10-hp drive motor is heavy and constant—but Tri-Clad, with its bearings completely enclosed in cast-iron housings, can take it! Maintenance department can't recall a single Tri-Clad bearing ever having to be replaced. Moreover, if they need it, the motors are easily geared while running.

GE

TRI-CLAD MOTORS

REG. U.S. PAT. OFF

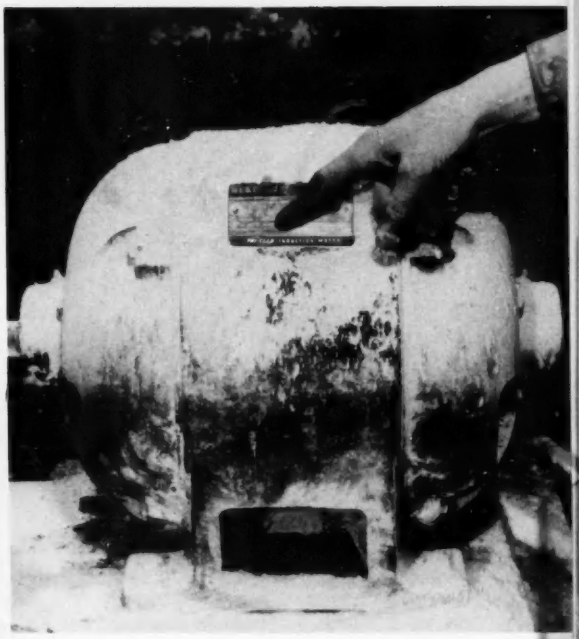
Help Keep ESNA Production Up!



PRODUCTION PUSHER General plant foreman Karl Kjellburg has the job of meeting "impossible" defense program manufacturing schedules. He's counting heavily on automatically fed machines like the Tri-Clad driven V. & O. press on his left, says, "This press inserts over 200 elastic fibre locking collars a minute in a ⅜" fastener. Driving it is a big job for a motor. Our Tri-Clads gave us no trouble during the war. We're counting on them again!"



TROUBLE SHOOTER TESTIFIES Ed Conk, ESNA's maintenance chief, must furnish reliable power wherever it's needed in the plant. He's got some definite ideas about electric motors; says, "We like a motor you can regrease easily *if you have to.* So far, we've had to regrease very few of our Tri-Clad motors. And those were either on hot spots or on particularly tough jobs. The point is—we *could* readily have regreased them all if it was necessary."



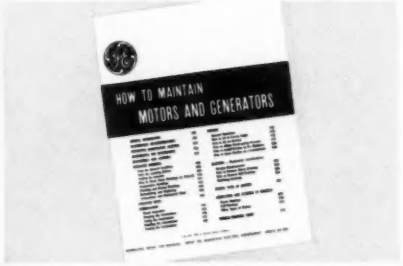
TOUGHEST... on the inside Extra protection against electrical breakdown is built into every Tri-Clad motor. Formex* wire windings, one-piece cast-aluminum rotor, double-end ventilation—these are features that prolong a general purpose motor's useful life.

TOUGHEST... on the outside Teeth rattling blows, dripping liquids, corrosive fumes—they're all in a day's work for Tri-Clad cast-iron construction. You get a rigid structure, too—one that won't twist out of line when you're bolting it down.

TOUGHEST... at the bearings A Tri-Clad motor will run safely without relubrication for as long as any general purpose motor you can buy. But, if the application does make relubrication a "must", you can grease your Tri-Clad without halting production.

** Reg. U.S. Pat. Off.*

How to Keep Your Motors in Shape for the Job Ahead!



TIMELY READING With every electric motor needed on the line, once again it's time to be a crank about motor care. That's why every motor user needs this General Electric manual. Tells how to spot motor and generator trouble before it happens, how to prevent serious breakdown, how to conduct a regular motor maintenance program. Order a copy for your maintenance department today! Use the coupon!

General Electric Company
Section 732-8
Schenectady 5, New York

Please send me my free copy of "How To Maintain Motors and Generators" (GET-1202)

Name_____

Company_____

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City_____ **State**_____

GENERAL ELECTRIC

Turn the page for the latest news on motor selection and application. ➡

NEED HELP IN TRAINING MANPOWER?

Here's a Valuable Tool! —G-E's New Course on

MOTOR SELECTION AND APPLICATION

9 Slide Films and Accompanying Manuals To Help You Get the Most Out of Electric Motors

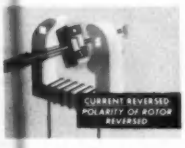
Timed to help meet the growing demand for skilled industrial workers, this new General Electric Motor Selection and Application Course is a boon to everyone concerned with technical training problems. Here, in 9 short, easily understood lessons, is a "how-to" course that offers a broad introduction and review of motor principles and uses to engineers, plant personnel, students and all others concerned with motors. *It's a valuable production-boosting tool for any type plant!* Ask your G-E representative for more details on this course or mail the coupon today.



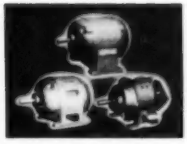
HERE'S WHAT THIS COURSE CONSISTS OF:

9 Sound slide films and records. 9 Sets of Review Booklets (10 per set) for student use. 1 Instructor's Manual—(This 96-page manual is virtually a complete course in itself.) Complete kit—Slide films, Review Booklets, and Instructor's Manual, in sturdy carrying case—**$100.00.**

Here's a Quick Look at the Scope of the Course



Lesson 1—"Fundamentals of Motors"—Basic principles of motor operation, how a-c and d-c motors work, construction features, etc.



Lesson 2—"Types of Motors"—Horsepower, speed and torque and other characteristics, ranges of application, design features.



Lesson 3—"Fundamentals of Selection"—A study of the five basic steps that are usually followed in the selecting of any motor.



Lesson 4—"A-C Polyphase Induction Motors"—Characteristics of the three basic types: squirrel-cage, wound-rotor, adjustable-speed induction.



Lesson 5—"Single-Phase Integral-HP Motors"—General range of applications, torque and safety factor, capacitor and repulsion-induction types.



Lesson 6—"D-C Motors"—Basic types: shunt, series, compound; horsepower formulas, adjustable speed applications, versatility, etc.



Lesson 7—"Synchronous Motors"—Where used, design features, power factor improvement, and other basic operating benefits.



Lesson 8—"Adjustable-speed Drives"—Speed range and versatility of various packaged adjustable-speed drives, typical applications.



Lesson 9—"Gear Motors"—Selection and application of the three classes of gear units. Advantages of these low-speed drives.

MAIL THE COUPON TODAY!

(Attach this coupon to your business letterhead and mail Today)

General Electric Company
Section 684-20
Schenectady 5, N. Y.

Gentlemen:

Your Motor Selection and Application Course sounds like it may be valuable in our training program.

☐ Send me a complimentary copy of the Course Manual, GEZ-310, for my inspection, at no cost to me.

☐ Send us a complete course for a 10-day free trial. If we do not return the course at the end of the trial period, you are to bill us $100.00 for this complete course.

Name_____

Company_____

Address_____

City_____ **State**_____

GENERAL ELECTRIC

684-20

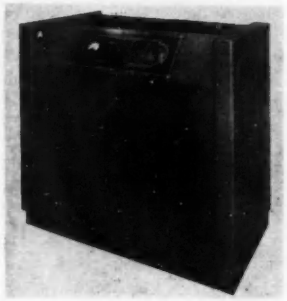
NEW PRODUCTS

For additional information please use coupon on page 58

(*Continued from page 64*)

may be used for several kinds of work by changing the heating coil and fixture, which attach at the front or top of the unit.

The generator provides stepless electronic power output control, from ½



Westinghouse 5-kw radio-frequency generator for induction heating.

to 5-kw—affording operating flexibility and uniform performance on repetitive setups. It delivers 5 kw of radio-frequency power at 100 per cent duty cycle, measured by approved NEMA standards. The generator is portable and easy to install; its load kva is high. An aluminum cabinet provides radio-frequency shielding, and electrical interlocks protect operating personnel.

C-109—Goggle and Glasses Lens Cleaning Tissue

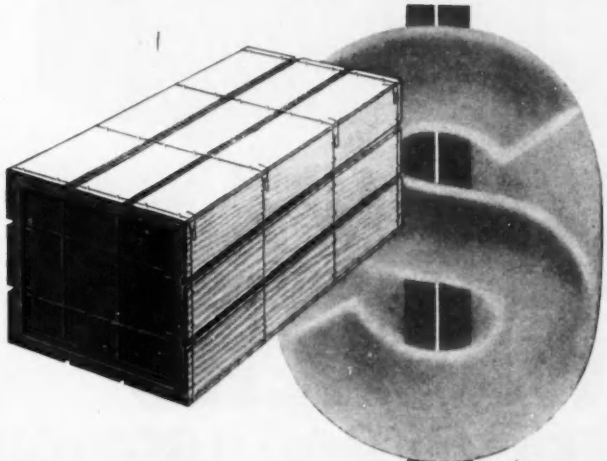


The General Electric Co. (Silicones Division) and the Silicone Paper Co. of America, Inc., New York City, have entered into the combined development of a superior silicone-treated tissue for cleaning goggles and glasses in factories, mills and offices. Sheets are especially interlocked for handling in a simple dispenser. They are sold under the trade-mark "Magic Lens Tissue."

C-110—Wire Mesh Pallet Containers

Palletainers manufactured by Union Steel Products Co., Albion, Mich., and made of heavy gauge welded wire mesh with steel pallet base for fork truck handling and stacking, have been improved with new cast steel leg supports which are welded both to bottom and reinforced steel base runners. This construction makes the base extra rigid. The design for the new leg support also provides a cast steel recess which acts as an interlock for stacking.

Another improvement is the new positive locking device shown in the inset picture. This heavy duty lock holds the sides of the Palletainer securely in upright position regardless of load; it cannot be released accidentally.



Good Boxes Cost Less

SUPERSTRONG boxes and crates—designed and constructed for your product alone—have a lower overall cost than just ordinary containers.

First cost is by no means the last cost. SUPERSTRONGS save on shipping space, reduce weight, occupy less storage space, cut down on damage claims. Total saving in dollars over the course of a year is often considerable.

Contact us for full information on the complete SUPERSTRONG line of quality shipping containers.

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WIREBOUND BOXES and CRATES
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Schmieg CENTRI MERGE WASHERS

FIRST Step • FIRST Choice • In FINISHING

You start right when you call upon Schmieg engineers for mechanical washers to fit your specific production requirements. And that's why you finish right, too. Because Schmieg washers are designed and engineered to give you high production cleaning, long trouble-free performance at low operating cost.

There's a Schmieg washer for any kind of job, a washer that will save floor space and can probably be loaded and unloaded by one man. Available in manual and automatically loaded types.

Convenience is emphasized in Schmieg washers, no matter what type—convenient controls, variable speed drives, doors that permit quick access to interiors for ease of maintenance.

No wonder Schmieg washers are first step and first choice in finishing!

Start right now by consulting Schmieg engineers for your washing requirements.

THE best AIR PURGE is CENTRI MERGE

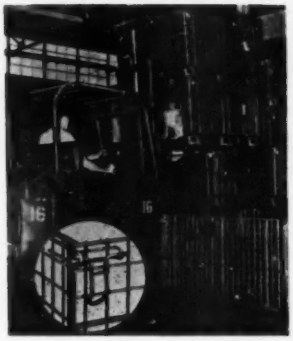
Schmieg INDUSTRIES INC.
Engineers & Manufacturers

318 PIQUETTE AVENUE • DETROIT 2, MICHIGAN

NEW PRODUCTS

For additional information please use coupon on page 58

With sides folded down, Palletainers occupy minimum shipping or storage space. Welded construction makes them practically shock proof. They are also fireproof, rust-resistant and easy to clean. Dirt and foreign matter drops



Palletainers at Union Steel Products Co. have new cast steel leg supports for extra rigidity. Inset shows new positive locking device.

through the mesh, and warehousing presents an orderly, clean appearance. They interlock and stack safely to ceiling height, handling loads up to 4000 lbs.

C-111—Constant Service Crane



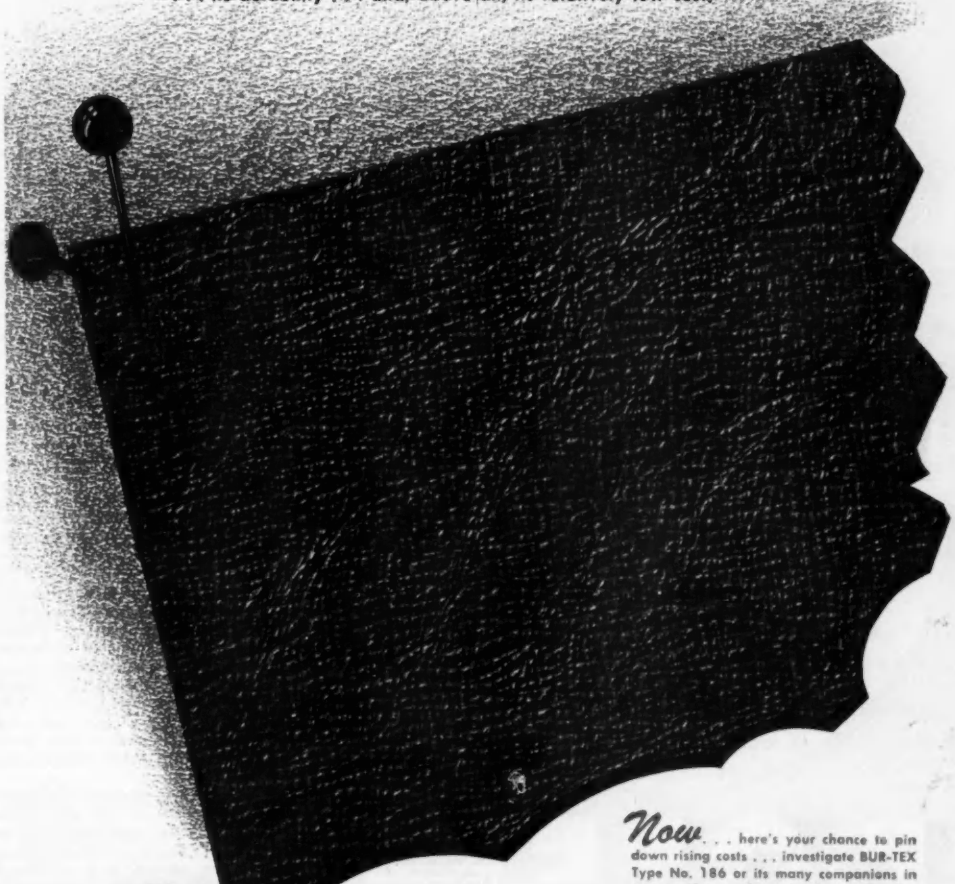
New articulated trolleys carrying this new crane are designed by American MonoRail Co., Cleveland, Ohio, so that each wheel bears its full share of the load in perfect alignment with the craneway tracks. All possible friction is eliminated by thrust bearings at all load bearing points, resulting in perfectly articulated trolley travel. Cranes so equipped are said to travel smoothly at higher than normal speeds under constant service operation. Two new methods of propulsion are available. One is fluid drive using the hydraulic coupling principle. The other is heavy gear drive consisting of a slip ring motor with heavy duty gear reducer directly connected to the drive shaft. Cranes can be interlocked for carrier travel beyond craneway areas.

(Turn to page 80, please)

Pin Down RISING COSTS

with TYPE No. 186 BUR-TEX *Automotive Trim*

Here is the automotive trim that is becoming part of more and more new automobiles, busses and trucks. It is a felt padding, coated with plastic and embossed with a Spanish grain to give it a rich leather-like appearance. Its many uses include seat facings, toe hole trim, kick plates, and package trays. Leading manufacturers like its beauty . . . its durability . . . and, above all, its relatively low cost.



Now . . . here's your chance to pin down rising costs . . . investigate BUR-TEX Type No. 186 or its many companions in automotive and truck trim, and noise deadener felts.

Bur-Tex

BURLINGTON MILLS INCORPORATED

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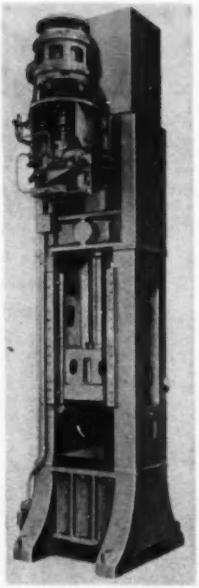
• PRODUCTION • NEW EQUIPMENT • PLANT •

For additional information regarding any of these items, please use coupon on page 58

(*Continued from page* 51)

B-72—Pipeless Circuit Hydraulic Press

Development of a new principle in hydraulic press construction announced by Elmes Engineering Div. of American Steel Foundries, Cincinnati, Ohio, is exemplified in the new Elmes "pipeless" metal-working presses built on this principle. The main hydraulic circuit has no piping. The only pipes in the entire press are the pilot, suction, and drain lines. Of these, only the pilot line carries high pressure. All high-pressure fluid is conducted through short, direct passages drilled in the structural parts. As a result, there are no high-pressure screwed joints to loosen, no oil dripping from loosened fittings, and no possibility of welded joints breaking loose, the company points out. Exceptionally smooth and shockless operation is said to virtually eliminate vibration.



Elmes drawing and forming press having complete absence of piping in the main hydraulic unit.

Downtime, officials say, is practically eliminated. The pumping unit can be removed as a unit assembly without disconnecting any piping. The valve unit, located in the oil reservoir, is also removable as a unit assembly. All pumping units and valve groups fit standard bolting and drilling layouts, making for greater flexibility in the variety of possible pumping arrangements.

Elmes pipeless construction makes press operation decidedly quieter. The pump is supported in a heavy cast steel bracket flange-mounted to the press cylinder, muffling and suppressing noise.

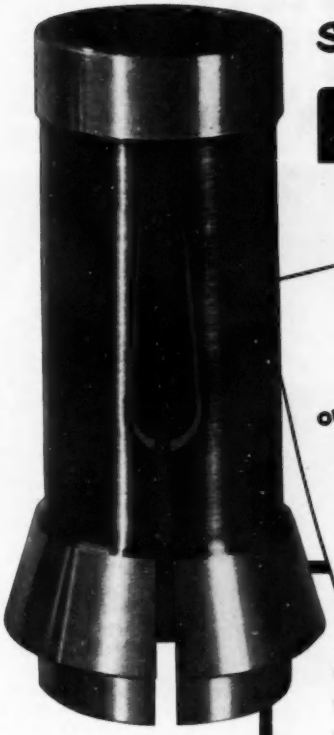
Reversing type hydraulic pumps, known to give the smoothest possible press performance, are used in the new circuit. Even the Elmes shifting and centering system is a miniature pipeless circuit in itself. Since this unit is mounted directly to the hydraulic pump, only electrical or mechanical connections need be made, depending upon the style of control.

The pipeless valve unit is really the heart of the new circuit, containing all necessary provisions for pre-filling dur-

(*Turn to page* 76, *please*)



"We've reduced machining costs plenty since we switched to ANTISEP BASE*!"



PRODUCTION DATA

PART: Collet

OPERATIONS: Forming, deep drilling, chamfer, boring and cut-off

MACHINE: 3" Conamatic

METAL: Hy-Ten Steel - "M" temper (Surface speed is 85 feet per minute, .005 feed)



Reports Midwest Collet Manufacturer

● This company was dissatisfied with the cutting oil they had been using. Results didn't justify exceptionally high costs. When they changed to Antisep Base—mixed 1 to 25 parts water—they got the good performance they were after, with an annual saving of $350. per machine!

You can use Antisep All-Purpose Base with full confidence. Dilute it with water, even for difficult machining previously done with straight cutting oils. Antisep provides great cooling ability, safety, finish and speed, enabling automatics, as well as other machines, to turn out better work much more economically

Antisep is high in anti-welding properties and film strength. It is antiseptically treated to eliminate rancidity and deter bacteria growth.

Ask the Houghton Man to show you how Antisep A. P. Base can be used "across the board"—both as a coolant and as a die lubricant for many stamping operations. Write or call E. F Houghton & Co., Philadelphia 33, Pa.

HOUGHTON

ANTISEP

ALL-PURPOSE CUTTING BASE

handles 90% of your machining operations—*even automatics!*



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containing actual performance proof of Antisep's cost-reducing features.

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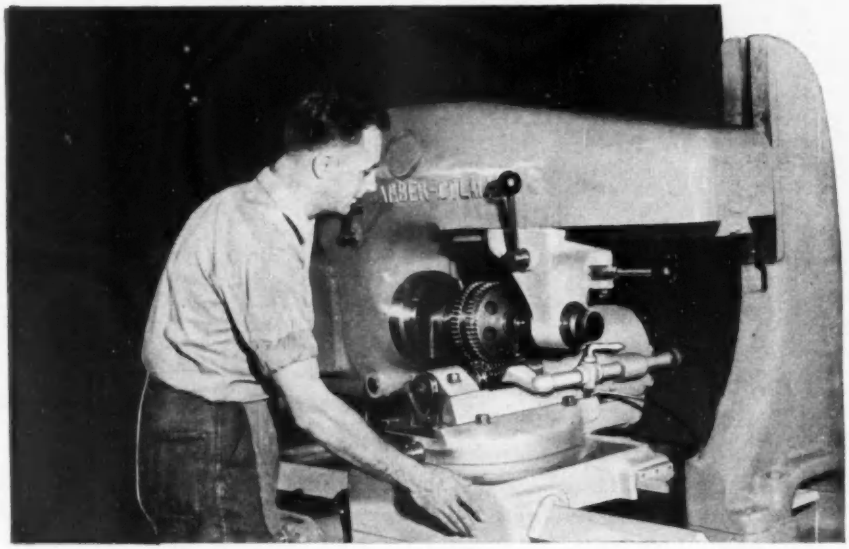
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Ready to give you on-the-job service . . .

Barber-Colman

No. 14-15 HOBBING MACHINES IMPROVE GEAR QUALITY...TRIM GEAR COSTS

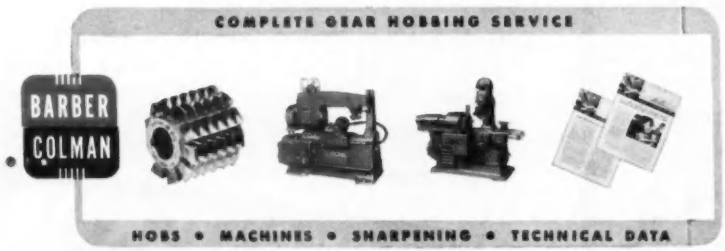


Tooth Profile Checks Within .0003″

Two outstanding features of the No. 14-15 Hobbing Machine provide exceptional gear cutting accuracy. A built-in differential permits successive roughing and finishing cuts without removing or aligning the work. A precision index worm gear, 18⅝″ in diameter, guarantees spacing accuracy within "tenths".

The 7 pitch transmission gears shown here are hobbed 2 per load in 17 minutes. Ground class A hobs, 3⅝″ diameter, are used at 129 rpm. and .090″ feed. Gears have 48 teeth, 11/16″ face and 7.139″ diameter. Average involute check is within .0003″. Average adjacent tooth spacing check is within .0005″.

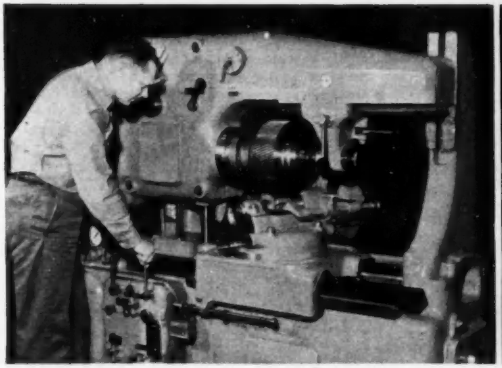
This machine accuracy in hobbing is especially important because tooth spacing errors cannot be economically removed by any known finishing operations.



Machines, like athletes, should be replaced when a substitute can do a better job — not when complete exhaustion forces removal from the field of play.

BUILDERS OF PRECISION GEAR

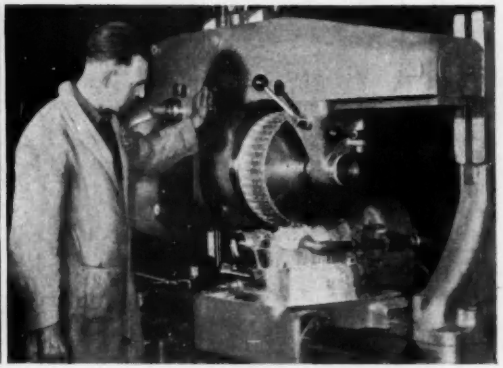
FINISH — HOB HEAVY CUTS IN ONE PASS
CUT HOBBING TIME PER GEAR 1/3 OR BETTER
HOLD LIMITS OF .0005" ON TOOTH SPACING AND PROFILE



Hobbing Time Cut From 33 to 13 Minutes Per Gear

This job shows *Multithread* hobs climb cutting 8 pitch, 11½" diameter helical gears in 13 minutes, compared with former time of 33 minutes. Hobs are 5½" diameter. Hob speed is 60 RPM. Feed of .060" per work revolution is used.

The rigidity and power of the No. 14-15 Machine furnishes ideal conditions for the application of large diameter *Multithread* hobs. The increase in the number of hob threads, large hob diameter, and fast work indexing combine to cut time per gear by nearly ⅓.



Finish-Hob ⅝" Roller Chain Sprockets In A Single Cut

These roller chain sprockets are an example of heavy, one-cut finish hobbing on No. 14-15 Machines. Sprockets are 15.179" diameter and are hobbed 8 per load in 35 minutes. Hob speed of 77 RPM and feed of .20" per minute are used.

Tremendous rigidity, power and weight of the No. 14-15 Machine prevent machine deflection and vibration, making possible such heavy cuts in one pass. This extra ruggedness furnishes single-cut capacity for spur and helical gears as coarse as 3½ pitch in some sizes.

● High output, heavy-cut finishing and extreme accuracy are obtained under normal operating conditions with the No. 14-15 Hobbing Machine. Because of these advantages and the rigidity to meet continuous high production schedules, many gear departments are substituting No. 14-15's for present equipment.

The machine cuts spur and helical gears up to 14" diameter, and as coarse as 3½ pitch in some sizes, as well as spline shafts, sprockets and other hobbed forms. It is widely used for hobbing automotive flywheel ring gears, transmission gears and shafts, rear axle shafts, drive sprockets and steering clutch hubs. You, too, can improve your gear quality and reduce costs by hobbing on the No. 14-15 Hobbing Machine.

Get the Complete Story . . . .

A new bulletin describes the range, capacity, output and extreme accuracy of the No. 14-15 Hobbing Machine. We'll be glad to send a copy without obligation. Ask for Bulletin No. 165.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 101 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

HOBS AND MACHINES SINCE 1911



"Pleased as PUNCH"

No production-line bottlenecks . . . and no hold-up in filling DO's since the grinding supervisor started using Simonds Abrasive Company wheels. No wonder he's pleased. You'll find plenty of satisfaction . . . and serviceability too . . . in these efficient production tools. Send now for free data book describing Simonds grinding wheels, mounted wheels and points, segments and abrasive grains . . . products proven in everyday industrial use . . . and backed by Simonds 50 years experience as a major grinding wheel manufacturer.



SIMONDS ABRASIVE CO.
grinding wheels

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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 58

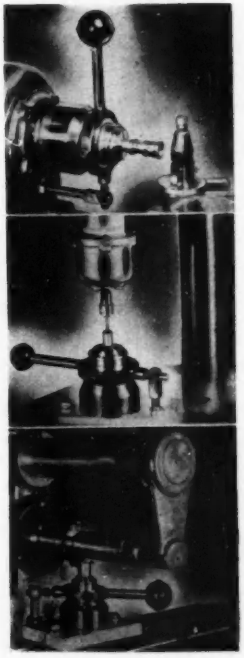
(*Continued from page 72*)

ing rapid advance, changing to pressing speed by either pressure or position, and decompression prior to reversal. These valves are designed in a wide range of sizes for application to many different speeds and tonnages. In extreme cases, multiple units are used.

Any Elmes hydraulic metal-working press, standard or special design, can be supplied with pipeless construction for the main hydraulic circuit. Elmes presses with the new pipeless construction are available at no premium.

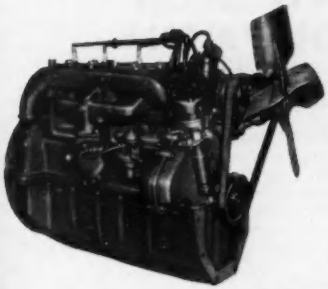
B-73—Draw Collet Chuck

For all turning, drilling, milling, grinding, deburring, polishing and other second operation uses the Stallion Mfg. Co. of Chicago, Ill., offers the Davos draw collet chuck. This chuck is designed for any model lathe, drill press or milling machine. The chuck is adaptable to all round, square, hex, and plain or serrated type draw collets, and

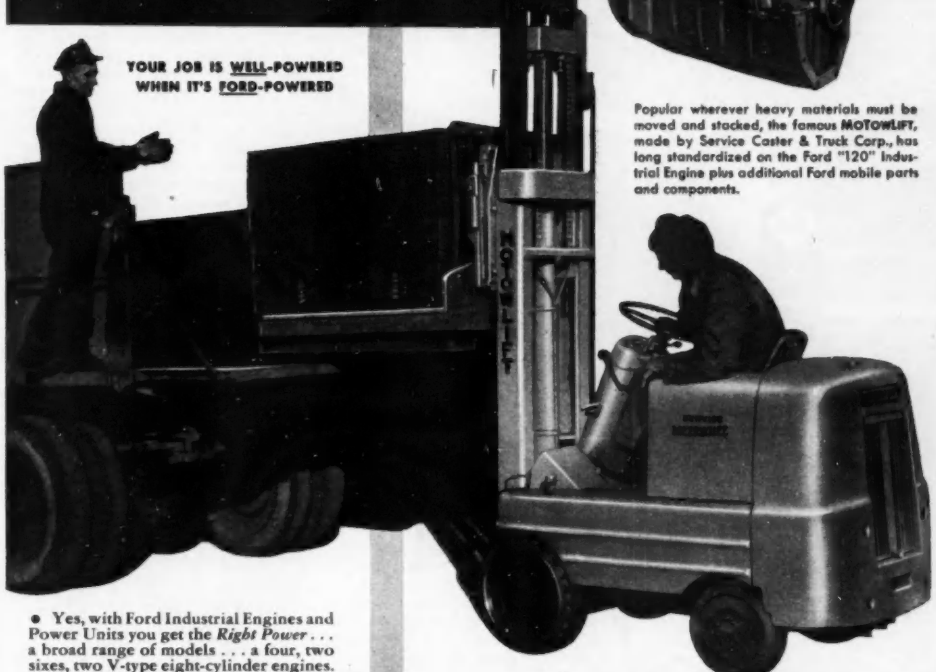


Stallion Mfg. Co.'s draw collet chuck in use on lathe, drill press and milling machine.

Power RIGHT with FORD POWER...



Popular wherever heavy materials must be moved and stacked, the famous **MOTOWLIFT**, made by Service Caster & Truck Corp., has long standardized on the Ford "120" Industrial Engine plus additional Ford mobile parts and components.



Our experienced Sales Engineers are at your service in developing engineering recommendations for the most efficient use of Ford Industrial Power in your application.

Ford

INDUSTRIAL ENGINES AND POWER UNITS

• Yes, with Ford Industrial Engines and Power Units you get the *Right Power* . . . a broad range of models . . . a four, two sixes, two V-type eight-cylinder engines. 120 to 337 cu. in. displacement, and every unit is individually tested, ready to run.

Ford power has the *Right Features*, too . . . equipment and accessories to meet specific operating requirements. There's Ford Industrial Power for just about every kind of application.

That's why Ford Power is a prime favorite of leading equipment builders and designers, especially at this time in building for defense. With Ford Industrial Engines there's *ease of application* . . . outstanding design adaptability. Specify Ford Power as an integral part of your industrial equipment and you standardize on the RIGHT Power with the RIGHT Features and the RIGHT Service.

Here are some typical Ford-powered Defense Applications:

Lift Trucks . . . Tugs . . . Welders Generator Sets . . . Pumps . . . Winches . . . Cranes Loaders . . . and many others

INDUSTRIAL ENGINE DEPARTMENT
Tractor & Industrial Engine Division
FORD MOTOR COMPANY
Highland Park, Michigan

Industrial Engine Department, FORD MOTOR COMPANY
15050 Woodward Ave., Highland Park 3, Michigan

I am interested in Industrial Power for this application:_____

Send me new 1951 literature on Ford Industrial Power (cu. in. dipl. and cylinders as shown).

☐ "120" 4-Cyl. ☐ "226" 6-Cyl. ☐ "239" V-8 ☐ "254" 6-Cyl. ☐ "337" V-8

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NEW PRODUCTION AND PLANT EQUIPMENT

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is adaptable to all special draw collets.

The chuck utilizes the lathe above the spindle bore for second operation uses. It has simple opening and closing lever action to permit loading and unloading while the lathe is in motion. Any type spindle stop may be used in the lathe with the collet chuck, as the collet will not move from permanent gripping actin when in "open" position due to a special permanent-stop feature.

Clutch bushing is declared never to wear in the same spot from constant opening and closing against the "fingers" of the chuck housing. As there is no forcing to tighten the collet in gripping position, the chuck will not wear out the threads on the collets. There is claimed to be no slippage regardless of the material being worked on. Working parts of the chuck are of alloy steel, hardened and precision ground.



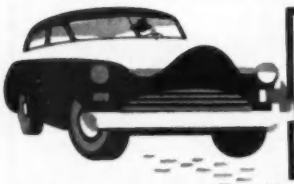
A direction signal light must do more than attract attention. It must demand it!

TUNG-SOL Flashers give signal lights compelling authority—in fact, have been doing it for more than twelve years on nearly 10,000,000 automobiles.

Two outstanding safety features of the TUNG-SOL Flasher for direction signals are instantaneous starting and provision for an instrument panel pilot light. The pilot light blinks in unison with the signal—assures the operator that his signals are working.

Small, rugged and highly dependable, the TUNG-SOL Flasher can be conveniently located in the electrical system and for all practical purposes, forgotten. Having but one moving part, it rarely requires attention and usually ends up in an automobile graveyard, still in good condition.

TUNG-SOL Flashers are made in a variety of types and for voltages from battery operation on up. Write for more information. TUNG-SOL LAMP WORKS INC., Newark 4, N. J., Sales Offices: Atlanta, Chicago, Dallas, Denver, Detroit, Los Angeles, Newark.



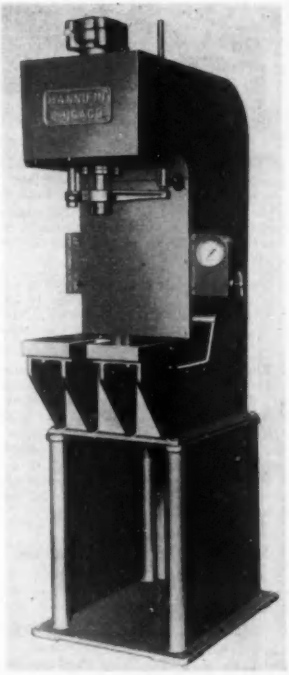
TUNG-SOL
SIGNAL FLASHERS

ALSO AUTO LAMPS, ALL-GLASS SEALED BEAM LAMPS AND ELECTRON TUBES

B-74—Line of Small Hydraulic Presses

With manufacture of two new hydraulic presses—a 5-ton and an 8-ton—Hannifin Corp., Chicago, Ill., now offers a complete line of small hydraulic presses, ranging from 1 to 10 tons, which are in addition to the company's line of 75 standardized presses in capacities to 150 tons.

Designated as the F-50A (5-ton) and the F-80 (8-ton), the presses are being offered with larger motor and pump and consequently higher ram speeds, as the F-51 and F-81 respectively. Still higher ram speeds can be furnished. Single manual lever control—handle down, ram down; handle released, ram up—is standard, but dual manual levers and electric push button control are both available. For repetitive production operations the stroke can be shortened by limiting the return stroke to the point where the ram just clears the work. Thus no ram motion, and therefore no productive time, is wasted, it is pointed out. Also, the actual force exerted by the press can be adjusted, anywhere in the range between 10 per cent and 100 per cent of maximum capacity, to deliver the exact pressure needed, and no more, time after time. The base, for floor mounting, shown in the picture, is specially designed. Presses are also available without the base, for bench mounting.



Hannifin hydraulic presses for floor mounting, Models F-50A, F-51, F-80, and F-81.



The use of N-A-X ALLOY STEEL in Aircraft Gas Turbines saves up to 50 per cent of critical Stainless Steel.

Conservation is possible – without sacrifice with use of N-A-X ALLOY STEELS

With the demand for greatly increased quantities of the critical and strategic Stainless Steels used in Jet Engines intensified by the acceleration of the building program, the Air Force requested the producers of these engines to seek *suitable* material with less critical alloy content to replace the Stainless Steel for certain moderate temperature application in these aircraft gas turbines.

The steel selected had to be of low-alloy content with high strength and good welding characteristics. Ordinary low carbon steel did not meet the requirements because of its low tensile properties and the fact that it could not be satisfactorily welded by the inert arc process, which is widely used in aircraft gas turbine manufacture.

The data available from tests made on several weldable low-alloy, high-strength steels indicated that N-A-X ALLOY STEEL was the most satisfactory of the group — *its selection followed.* Unlike other possible substitutes, N-A-X ALLOY STEEL has good low temperature impact values, maintains its higher strength and is not subject to temper brittleness in the wide operating temperature range required of the steel for this purpose — from a low of −70°F. to +800°F.

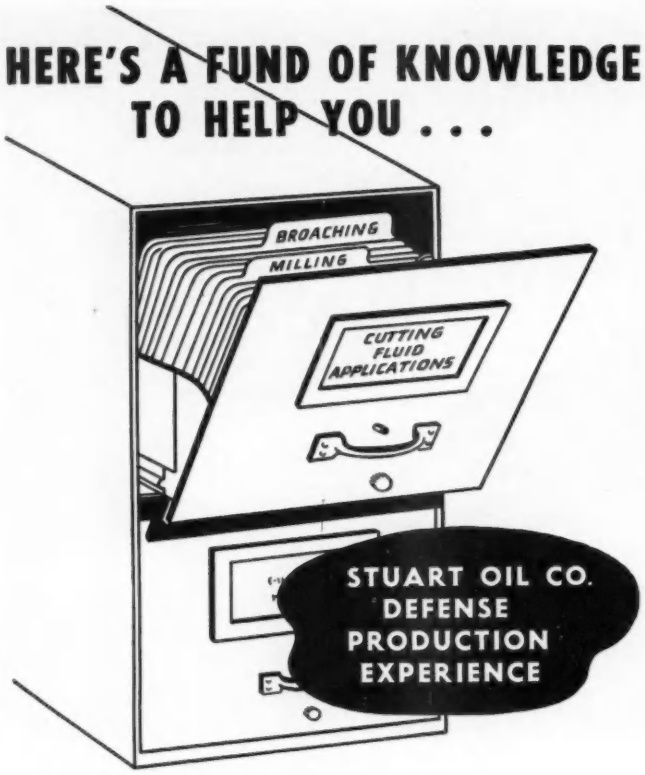
The use of N-A-X ALLOY STEEL for this application has cut the amount of Stainless Steel required in half. This is of considerable importance to the Air Force.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division — Ecorse, Detroit 29, Michigan

NATIONAL STEEL CORPORATION

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Ordnance



Aircraft



Transportation

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Use Stuart as your clearing house for helpful information.

WRITE TODAY, or call our nearest office outlining your specific problems.

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2733 S. Troy St., Chicago 23, Ill.

NEW PRODUCTS

For additional information please use coupon on page 58

(*Continued from page* 70)

C-112—Mg Dockboards; Hand Trucks; Die Tongs

Magline, Inc., Pinconning, Mich., is presenting a new, standard line of lightweight magnesium dock boards provided with a fully adjustable automatic drop lock which drops down against the dock and locks the board securely in position to prevent slippage. It permits a truck to back up to within three inches of the dock, and where the truck bed is lower than the dock level, the dock board can be reversed by turning it around. The boards, crowned to compensate for height differences, are available in Series M1, rated to carry 1000 lb per axle, and Series M2, rated at 2000 lb per axle.

Magline, Inc., secondly presents a new heavy duty all magnesium hand truck, Model 40-D-600-SC (not illustrated), weighing less than 12 lb. Addition of stair climbers permits transporting loads between two levels (stairs, ramps, etc.) with less effort. A curved back frame facilitates carrying all types of packages, containers and bulk goods.

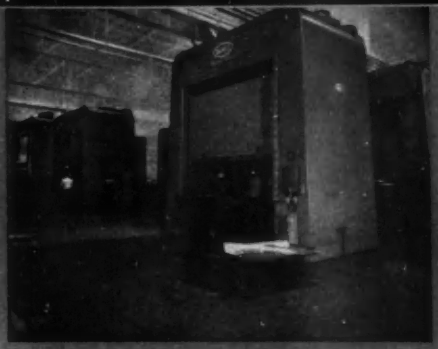


Magline magnesium dockboard and hand truck, marketed by Magline, Inc.

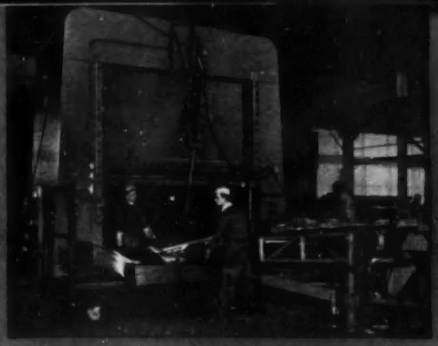
Magline thirdly offers magnesium alloy safety tongs for press and shear feeding, designed to crush, if caught within the die opening, without inflicting damage to the die itself. Combining lightness, strength and rigidity, these Magline tongs permit easy one-hand operation and higher production speeds, while reducing operator fatigue. Medium duty tongs weigh only 6 oz.

(*Turn to page* 84, *please*)


Know
How
Kelsey-Hayes
Known for Know-How
in products for peacetime
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Kelsey
Hayes
8 KELSEY-HAYES WHEEL COMPANY PLANTS:
4 KELSEY-HAYES PLANTS IN MICHIGAN
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UNOBSTRUCTED PRODUCTION AREAS like the one around these Danly Underdrive Presses are a feature of underdrive press installations—and typical of the efficient working conditions found in the new Buffalo Stamping Plant of the Ford Motor Company.



FINISHED STAMPINGS are removed from the press automatically here at the end of the line by an automatic unloading device. This mechanical handling, "Automation," is a Ford development for increased material handling efficiency.

Producing Big Stampings Faster with DANLY UNDERDRIVE at FORD'S new Buffalo Stamping Plant

Uninterrupted press operation and speedy, efficient material handling are vital in the production of large automobile body stampings. Big Danly Underdrive Presses like these fill the bill in the huge new plant of the Buffalo Stamping Division, Ford Motor Company.

Danly Underdrive Press design provides maximum head room for crane ways, extra clear working space to facilitate material handling, and keeps nearly all service and maintenance operations on a separate sub-floor level, clear of the production area. In addition, Danly features like the exclusive Danly Cool-Running Clutch and pressure lubrication monitored by a safety switch automatically assure steady, dependable performance under the punishment of continuous high speed production.

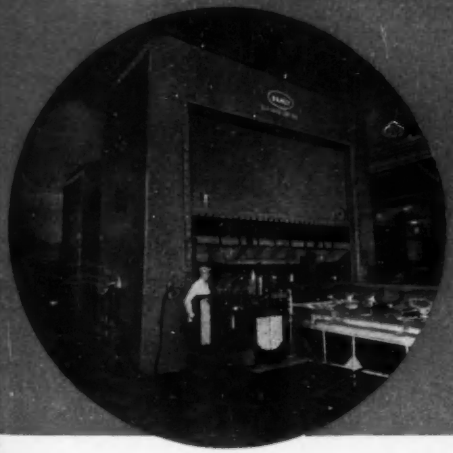
Call a Danly Press Engineer today for a specific discussion of the advantages of Danly Presses on *your* production line.



Mechanical Presses . . . 50 to 3000 tons

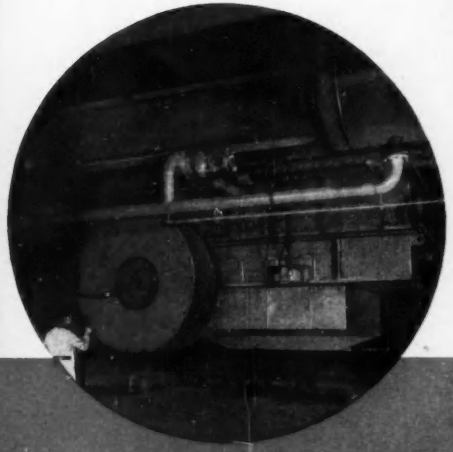
DANLY®

IT COSTS LESS TO RUN A DANLY PRESS

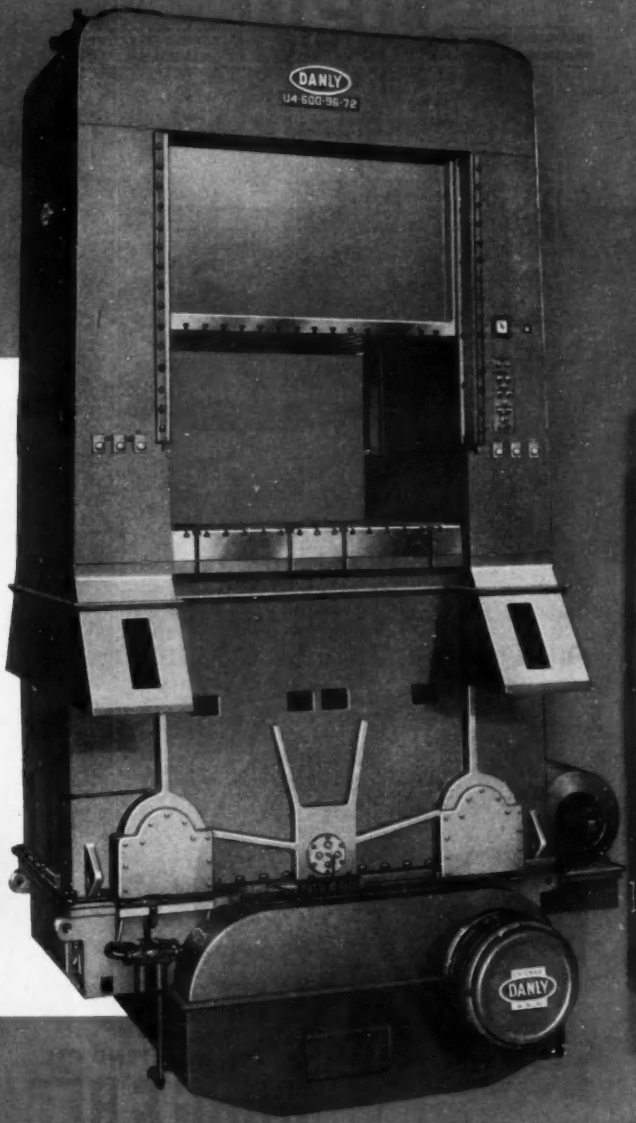


WORKING LEVEL VIEW of a Danly 1000 Ton Underdrive Press performing a piercing operation on front floor pans for Ford production. These big stampings are automatically conveyed to the dies by Ford "Automation."

PRESSES



SUB-FLOOR VIEW of Danly Underdrive Press showing clear working space for service and maintenance—obstruction of the working area above is unnecessary. Note the outboard mounted position of the Danly Cool-Running Clutch, simplifying maintenance still further.



CLEAN FUNCTIONAL DESIGN above the production level keeps working space open; easy access to all main working parts from the sub-floor level speeds servicing. Friction disc type lining in Danly Cool-Running Clutches and Brakes can be completely replaced in less than 30 minutes.

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

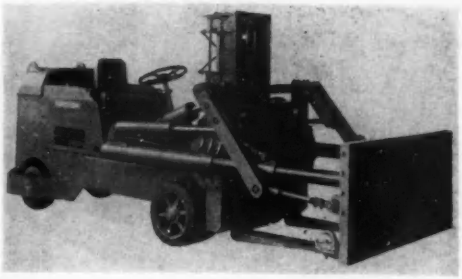
NEW PRODUCTS

For additional information please use coupon on page 58

C-113—Die Handling Unloader Accessory

(*Continued from page 80*)

Handling heavy dies, and transporting them to and from the die table of a press is simplified by an unloader accessory offered by the Towmotor Corp., Cleveland, Ohio.



Towmotor unloader accessory.

Shown below on a Model LT-90 Towmotor lift truck, the unloader makes it easy to place a heavy die on the die table. The die is lifted and transported with the pusher plate retracted, and is unloaded onto the die table by extending the plate.

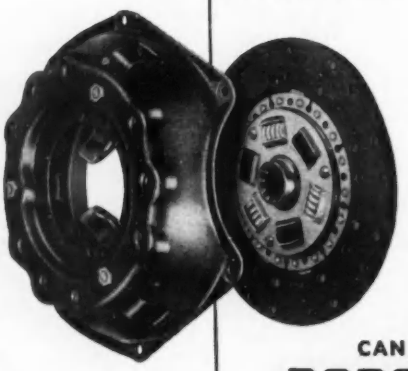
To pick up the die from the table, a chain is passed around the die and linked to the hooks at each side of the pusher plate. When the plate is retracted, the die is pulled onto the lift truck forks.

The development also is suitable for speedy handling and positioning of heavy jigs and fixtures on various types of machines.

Engineered by

BORG & BECK®

means . . . CLUTCHES built to the exacting standards which have made the name BORG & BECK famous for 36 years!



YOU CAN DEPEND ON

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CLUTCHES . . . FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD

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BORG & BECK CLUTCH THE STANDARD

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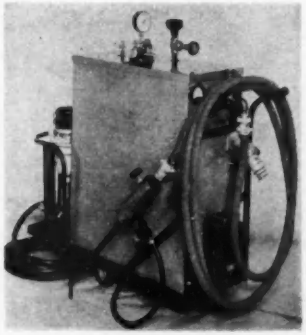
CHICAGO 38, ILLINOIS

C-114—Steam Jet Cleaner

Recently placed on the market by Livingstone Engineering Co., Worcester, Mass., is a new, smaller steam-jet cleaner identified as the JC-20. Like the Speedylectric JC-30, this new lower priced model is an all-electric, portable unit and only 16 in. wide and 40 in. long.

It is said to clean machinery, equip-

(*Turn to page 87, please*)



Livingstone Specification steam jet cleaner, JC-20.


Using copper in your product?
where you need only the
solid surface
-that's all you need to buy!
SuVeneer®
CLAD METALS
If you don't use the "inside" of the gauge thickness in your copper strip applications, have the core of plain steel—and save money as you save essential copper for defense! With SuVeneer Clad Metals, you get the dense, solid surface of copper, bonded inseparably to low carbon strip steel on one or both sides. You get the performance you need, at lower cost. ● Write for the detailed facts.
Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA





A LIPE MULTI-LEVER CLUTCH GIVES MORE ENGAGEMENTS BETWEEN TEAR-DOWNS. The reason is plain. There's only one spring. Pressure is evenly distributed all around the pressure plate by 20 pressure-equalizing levers. Every part of the pressure plate touches at the *same instant* . . . with the *same pressure.* There's no cocking of the plate, no high spots—no localized burning. The clutch engages smoothly without babying; holds without slippage in final engagement.

●

Write for Service Manual and complete data on genuine Lipe parts—stocked in principal cities.

LIPE ROLLWAY

Lipe-ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools

Syracuse 1, N. Y.

NEW PRODUCTS

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(*Continued from page 84*)

ment and facilities safely and silently and it may be operated in a crowded factory or workroom without danger or annoyance to nearby operators on adjacent machines. Unlike the fuel fired "steam" cleaning machines which depend on hot water and large quantities of solvents under pressure for their cleaning action, this JC-20 uses steam from the built-in high-pressure Speedylectric boiler. Small quantities of solvents are used but are not diluted by mixing with gallons of water at the jet. Dirt, grease, oil and caked-on accumulations are said to melt away before the high velocity jet of hot dry steam and solvents applied instantly as needed under push button control. There is no flooding of the working area, no smoke, flames or fire hazard.

Furthermore the Speedylectric unit is completely free of low water danger, the company points out, since the boiler water itself is the electric resistance heating element. Therefore, if there is no water, no current passes and no steam is generated. The boiler is the Speedylectric Model 600-3 built under ASME Code, carries National Board stamp and is Underwriters' Laboratories listed. The unit is available for 220, 440, or 550 volts.

C-115—Door Trim of Rigidized Metals



Rigidized Metals Corp. application of rigidized metals for car door trim.

New application for stainless rigidized metals as interior door trim is brought to attention by Rigidized Metals Corp., Buffalo, N. Y. Selected by one of the top automobile manufacturers because of its mar-resistant qualities and highly decorative effect, its three dimensional design is declared to protect shiny surface beauty from scratches, scuffs and dents so common on car door interiors. The 1-WL pattern tends to conceal ugly mars within the design itself unlike plain polished sheets, it is said. Rigidity of the metal it is pointed out, permits gage thickness reduction, allowing conservation of critical materials.

C-116—Bonding Agent, Rubber-to-Metal

A new chemical development made by General Electric's Chemical Dept., Pittsfield, Mass., makes possible a bond between silicone rubber and metals or ceramics, said to be stronger than the rubber itself. Designated as G-E 81267 primer, this new development is a thin, light-colored liquid. By using it, G-E silicone rubber 81223 can be bonded to





NEW PRODUCTS

For additional information please use coupon on page 58

almost any surface. It bonds to glass, ceramics, aluminum, steel, tin, and copper. Sheer strength measurements of bonds on steel are approximately 700 lbs per sq in.

To mold and bond these G-E silicone rubbers to a surface, it is necessary to first remove all grease and dirt from the surface. The primer, G-E 81267, is then applied by dipping and draining, spray, or brushing. The lm should then be allowed to air-dry for 20 minutes. Some surfaces, such as tin, require a short heat treatment to complete the drying. The surface is then rinsed with water and dried.

The primed surface can now be molded under pressure at 125C against freshened G-E high-strength silicone rubber compound from 10 to 20 minutes, or 20 to 25 minutes in 40 psi steam, and may usually be removed from the mold hot.

The development of G-E 81267 primer makes possible a wide variety of silicone rubber-to-metal molded products which include shock and engine mounts that resist both high and low temperatures. Improved rubber-glass laminated structures are also possible.

C-117—Dry-Bearing Alloy; Machines Without Coolant

A new metal alloy suitable for dry bearings, precision castings, fluxless welding and to conduct heat from other metals,—a development of Chemalloy Associates of Santee, Calif.,—has been announced by Transport Products Corp., Louisville, Ky., under the name "Chemalloy."

Chemalloy is described as an alloy of metals and chemicals produced by bringing together an alloy of molten metal plus an alloying of a wet chemical mass. Once the original metal is made, it can be melted or remelted like ordinary metals. Chemalloy obtains from a family of metals which, it is claimed, may eventually include every type—Chemalloy zinc, Chemalloy lead, Chemalloy copper, Chemalloy aluminum, etc. The first metal to become commercially available is Chemalloy zinc which is composed of zinc, manganese bronze, solder, hydrochloric acid, sulphur and special chemical carriers.

According to the manufacturer's claims, Chemalloy may be machined with or without coolant, and when used as a bearing it can be operated dry or, if desired, oil or water may be used as a lubricant.



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AUTO-LITE serves the nation's needs . . . with more than 400 products used as original factory equipment on many leading makes of America's finest cars, trucks and tractors. By building products of the highest quality and dependability . . . Auto-Lite has grown to be the world's largest independent manufacturer of automotive electrical equipment . . . and the best advertised name in the automotive after market. Today's buyers of cars and trucks know "You're Always Right With Auto-Lite."

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WORLD'S LARGEST INDEPENDENT MANUFACTURER OF AUTOMOTIVE ELECTRICAL EQUIPMENT

NEW PRODUCTS for AIRCRAFT

For additional information regarding any of these items, please use coupon on page 58

R-29—Super-Strength Aluminum Alloy

A rugged new aluminum alloy, developed by Aluminum Co. of America, Pittsburgh, Pa.—10 per cent stronger than the highest strength aluminum alloy now in use—is being made available to plane builders for experimental and controlled production purposes only. It has been temporarily designated "XA78S."

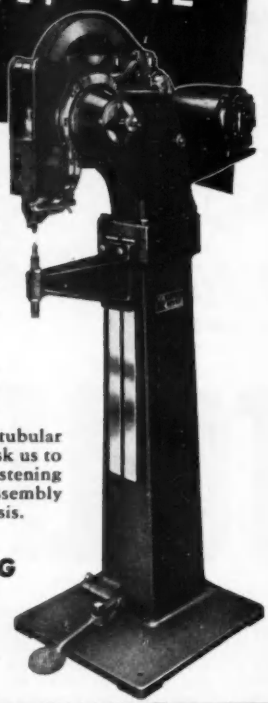
This higher-strength material may permit lighter airframe construction, since less metal will be needed to meet every structural strength requirement. Any reduction in plane weight could mean additional bombs, more fuel for longer range, more guns to ward off interceptors, increased speeds, or any desirable combination of these advantages, ALCOA points out.

This particular metallurgical advancement, alloy XA78S, was accomplished by modifying the same alloy constituents that were combined to produce Alcoa alloy 75S, the alloy designed expressly to meet the needs of the aircraft industry back in 1944. The main alloy composition is the same for both 75S and XA78S in that they are of the aluminum-zinc-copper-magnesium family. However, XA78S is approximately 10 per cent higher in tensile and yield strengths than Alcoa alloy 75S, with about the same elongation and fatigue properties. Limited tests are said to indicate that the increase in mechanical properties of XA78S will involve some sacrifice in workability.

For the present, the new alloy will be confined to the production of sheet and plate — both in bare and alclad forms—and extrusions. Manufacture of additional forms of XA78S will come as soon as production problems concerning the presently available forms are completely worked out.

The announcement of this new experimental high-strength aluminum alloy represents the culmination of several years of continued cooperation between Aluminum Co. of America, Navy Department Bureau of Aeronautics, the U. S. Air Force, and the aircraft industry.

Chicago RIVET "912"
AUTOMATIC RIVET SETTER
CUTS COSTS 3 WAYS



1 FASTENS FASTER . . . Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on the foot pedal automatically feeds, inserts and clinches the rivet.

2 DOES WORK OF SEVERAL MACHINES Quick change rotary hopper and raceway makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.

3 SAVES ON MAINTENANCE . . . The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

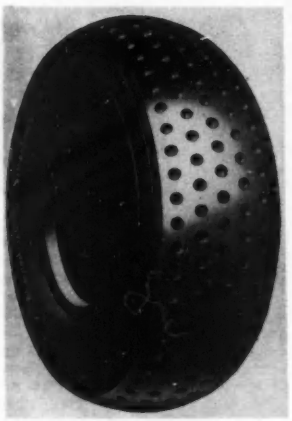
If your assembly calls for 3/16" steel tubular rivets or smaller, of ¾" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.



FREE CATALOG
contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

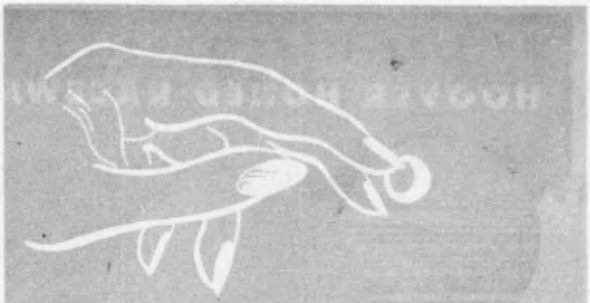
Chicago Rivet & MACHINE CO.
9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois
Branch Factory: Tyrone, Pa.

R-30—Dimple Tread Airplane Tire



New airplane tire with a dimple tread, consisting of small, cup-like depressions throughout the tread area, a product of the B. F. Goodrich Co., Akron, Ohio. Tires are available at present in three sizes, 15.50-20; 17.00-16 and 34 x 9.9.

(*Turn to page 92, please*)



PUSH BUTTON STARTING

COSTS LESS

WITH Bendix

STARTER DRIVE

The *ease and convenience* of push button starting has made it a popular feature with the car-buying public. The *economy* of push button starting with the Bendix Drive has made it the choice of leading car manufacturers. This unique combination of quality and low cost is made possible by Bendix exclusive design features. For example, the Bendix* Starter Drive requires no actuating linkage and the solenoid may be placed in any convenient position. Result—starting motor can be mounted more easily and in more positions. Also the Bendix Drive has fewer parts and needs fewer adjustments. For true economy from installation to service, plus performance proven by over 85,000,000 installations, be sure to specify Bendix Starter Drive. Your inquiry will receive immediate attention.

*REG. U.S. PAT. OFF.

ECLIPSE MACHINE DIVISION of

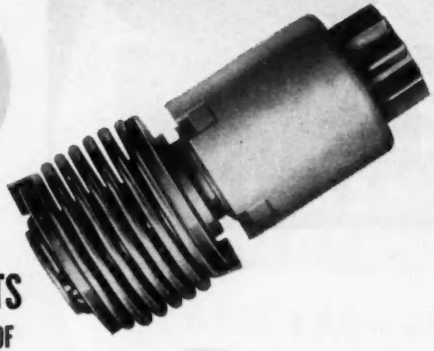
Bendix AVIATION CORPORATION

ELMIRA, NEW YORK

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.



PUSH BUTTON





FLOOR BUTTON

SPECIALISTS IN ALL TYPES OF STARTING!



SWITCH KEY

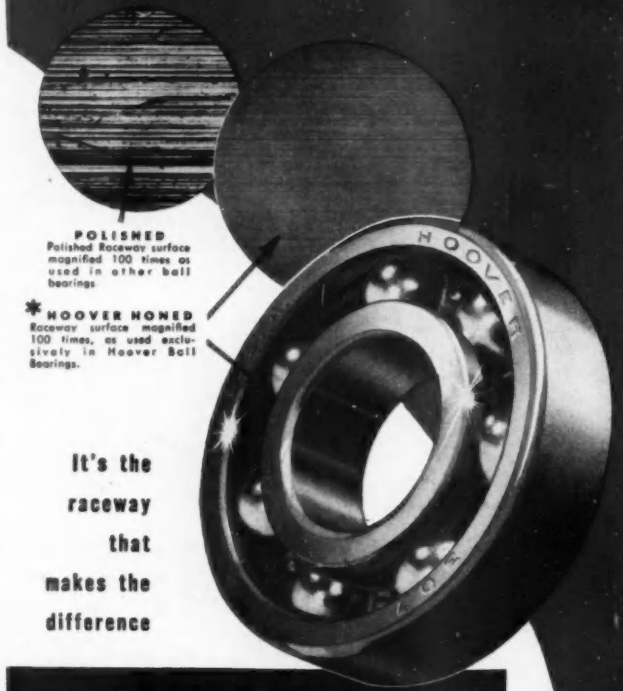


ACCELERATOR



CLUTCH PEDAL

Nothing is as smooth as a
HOOVER HONED RACEWAY*



It's the raceway that makes the difference

HOOVER
America's only
BALL BEARING
with Honed Raceways

90% longer life
30% greater load
Amazing Quietness

The Aristocrat of Bearings

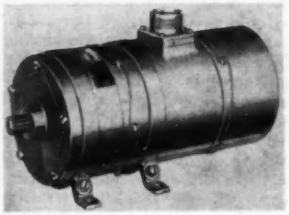
HOOVER BALL AND BEARING CO.
ANN ARBOR, MICHIGAN

New *AIRCRAFT* PRODUCTS

For additional information please use coupon on page 58

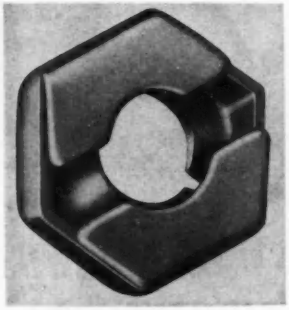
(*Continued from page* 90)

R-31—AYLC Torque Limit Actuator



AYLC torque limit actuators put out by Barber-Colman Co., Rockford, Ill., afford positive, accurate positioning, actuators stopping when the load exceeds the rated capacity. Travel from a few degrees up to several hundred shaft revolutions is declared possible with no adjustment. Type AYLC actuators are available with a wide range of gear reductions for loads up to 500 lb in. Units can be supplied with variable mounting details, drives, and with or without radio noise filters.

R-32—Lightweight Hex Lock Nut



New hex lox nut placed on the market by the Prestole Corp., Toledo, Ohio, exceeds by test specification MIL-N-3337, and is declared the only sheet metal nut with a double lock. Claimed to have twice the tensile strength of ordinary spring nuts, it is 70 per cent lighter in weight than conventional lock nuts. A one-piece double action spring lock nut, it provides a 360 deg. grip into the root of the screw. Wright Field tests completed in March are cited to show this new hex lox nut as having the highest installation torque, highest prevailing torque, and highest back-off torque. The same Wright Field tests also showed the nut to have excelled in vibration tests and in tensile strength. Made of SAE-1060 steel in thicknesses of 0.016 and 0.020 in., the hex lox nut is now in production in the five most popular sizes for machine screws 6-32, 8-32, 10-32, 10-24, ¼-20.

Every Engine-minded man should read this...



Mail Coupon Now!

Policy

"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."

MUSKEGON PISTON RING COMPANY
MUSKEGON, MICHIGAN

Please send me a copy of your Engineering Bulletin on "Flexline" Piston Rings.

NAME

COMPANY

CITY ZONE

STATE

Defense Facilities Approved for Fast Tax Writeoffs

CERTIFICATES of necessity permitting rapid tax write-off on outlays for new or expanded defense facilities issued between October 30 and April 26 to companies engaged in making various types of automotive military equipment including trucks, tanks, motorized gun carriages, and aircraft, etc., as well as components, repair parts, and maintenance equipment, are listed here.

The first applications were filed with the National Security Resources Board on October 30, 1951, and certificates of necessity for tax amortization were issued by that agency through January 24, 1951. Beginning January 25, certificates have been handled by the Defense Production Administration.

The percentage authorized for actual amortization varies according to the type of facility. At present, the average is 69.5 per cent.

Certification as an important defense facility permits companies expanding productive facilities to depreciate the cost of new facilities at the rate of 20 per cent a year over a five-year period.

— A —

Acme Industrial Co., Chicago
Aircraft hydraulic parts—$45,942

Aerojet Eng. Co., Azusa, Calif.
Ordnance supplies—$611,000

Aero Supply Mfg. Co., Corry, Penna.
Aircraft parts—$118,000

Aero Trades Mfg. Corp., Mineola, N. Y.
Aircraft parts Assy.—$30,000

Ahlberg Bearing Co., Chicago, Ill.
Ball bearings—$550,000

Aircraft Eng. Prod., Clifton, N. J.
Aircraft parts—$52,464

Aircraft Fitting Co, Cleveland
Aircraft hose couplings—$124,506

Aircrafts Products Co., Clifton Hts., Pa.
Aircraft parts—$12,354

Aircraft Tapered Sheets, Los Angeles
Wings & fuselage fittings—$499,204

Air Research Mfg. Co., Los Angeles
Aircraft parts—$608,777

Air Research Mfg. Co., Phoenix, Ariz.
Aircraft parts—$1,959,728

Allis Chalmers Mfg. Co., La Porte, Ind.
Cargo tractor—$2,576,000

Aluminum Co. of America, Cleveland
Aircraft engine forgings—$2,749,000

American Brake Shoe Co., Detroit
Brake lining—$13,593

American Brake Shoe Co., Chicago
Forgings for tank track, shell bodies.—$172,969

American Non-Gran Bronze Co., Berwyn, Pa.
Aircraft engine valve guides—$60,412

Apex Tool Co., Bridgeport, Conn.
Aircraft engine parts—$135,939

Atwood-Vacuum Machine Co., Rockford, Ill.
Aircraft parts—$1,500,000

Austenal Laboratories, Rockaway, N. J.
Jet engine parts—$292,850

Avco Mfg. Co., Williamsport, Pa.
Aircraft tappet guides—$23,468

Axelson Mfg. Co., Monteballo, Calif.
Aircraft landing gear—$655,000

Axelson Mfg. Co., Vernon, Calif.
Aircraft assemblies—$230,688

— B —

The BG Corp., Ridgefield, N. J.
Spark plugs—$1,400,000

The Borden Corp., Wheatfield, N. Y.
Ball bearings—$622,693

Bell Aircraft Corp., Wheatfield, N. Y.
Research, development—$250,000

Bendix Radio Div., Towson, Md.
Radar equipment, etc.—$1,008,474

Bendix Products Div., South Bend, Ind.
Aircraft landing gear—$1,183,668

Boeing Airplane Co., Seattle, Wash.
Aircraft—$281,014

Boeing Airplane Co., Seattle, Wash.
Aircraft & accessories—$4,941,916

Bower Roller Bearing Co., Detroit
Roller bearings—$2,122,686

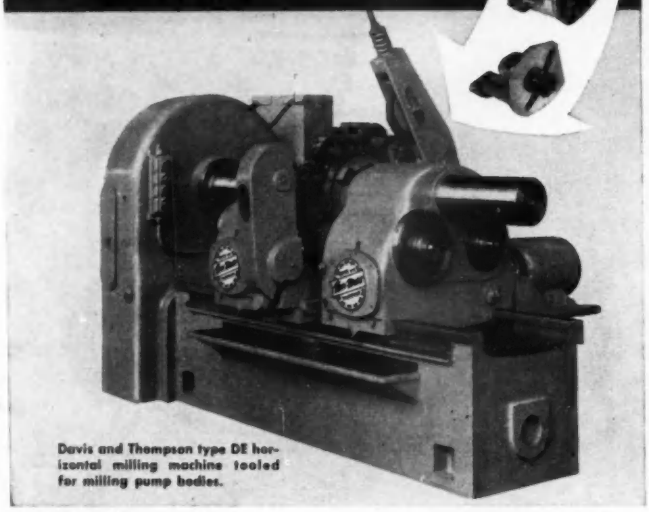
Burgess-Norton Mfg. Co., Geneva, Ill.
Tank truck bodies—$157,609

Burgess-Norton Mfg. Co., Geneva, Ill.
Tank parts—$692,975

Boudaille-Hershey Corp., N. Chicago, Ill.
Tank track links—$640,000

(*Turn to page 98, please*)

264 Pump Bodies Per Hour . . . . . .



Davis and Thompson type DE horizontal milling machine tooled for milling pump bodies.

1-A Standard Horizontal Milling Machine

Oil pump bodies requiring high degree of finish and high production are rough and finish milled on both sides simultaneously with this Davis and Thompson type DE milling machine. Production is 264 pieces per hour.

Patented Angular Spindle Adjustment Allows "Toe Cutting"—Maintains Fine Finish at High Production

The finishing spindle is provided with an exclusive D&T design which allows angular adjustment. This in turn results in "toe-cutting" and eliminates "drag" of the cutter over the finished surface. Both roughing and finishing spindles have micrometer endwise adjustment.

A Basically Standard Machine Employing Roto-Matic Principle For High Production Special Milling

Like all D&T machines this model DE is designed for long life and trouble-free operation. Each head has independent drive. There is backleash take up to mandrel. Anti-friction bearings throughout. Rapid traverse between cuts can be incorporated.

Free Data will be furnished upon request.

DAVIS and THOMPSON Roto-Matic

Davis & Thompson Company

6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN

we're up to our necks in a paradox!



Prior to the introduction of M-12 and Amendments we urged you to use Revere Copper and Copper Base Alloys for parts used in your automobiles, trucks, tractors and buses. Now, with some of those parts on the "can't-make-of-copper" list and others bound to be in short supply due to D. O. rated orders taking priority over civilian uses, we will be unable to furnish the quantities you want and as fast as you would like to have them. However, we still want to plug the merits of Revere Copper and Copper Base Alloys, so that once they are again available in the desired quantities, you will again use them. A paradoxical situation. But paradox or no, we can still be of help to you with problems which present conditions will create. Our Technical Advisory Service has helped automotive manufacturers and their suppliers make less metal do more; and with equal efficiency. This had been made possible through such things as: the use of a different alloy, a change in gage, redesign of a part or a change in production technique. This knowledge, gained through 150 years of experience in working with metals, can also prove useful in your D. O. work which is bound to bring you new headaches. Why not put this knowledge to work on your problems by contacting the Revere Office nearest you, today?

REVERE 150 YEARS OF SERVICE TO AMERICA

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

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Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere.

SEE "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY



BLISS—for armament production by presses

HERE'S WHY...

If you plan to produce small arms ammunition, artillery cases, projectiles, military vehicles, aircraft parts, fuses, chemical containers or any one of thousands of pressed metal components for ordnance materiel—Bliss is the company best qualified to recommend both the equipment and methods. For Bliss designed and built more pressed metal machinery than any other company during World War II. It's logical to call on Bliss because:

Bliss has the engineering experience—over 90 years of it—and the manufacturing capacity—four plants—*to equip complete projects.* Bliss builds more types and sizes of presses than any other company in the world.

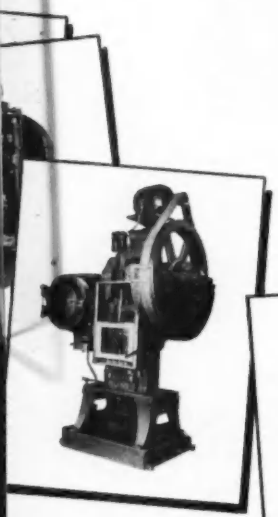
Bliss is skilled in all phases of press design—mechanical and hydraulic—for the drawing and extrusion of steel, copper and brass...for light metals and powdered metals.

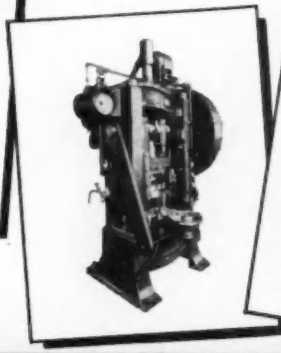
Bliss builds the full range of automatic feeding, indexing and ejecting devices to obtain the maximum press output.

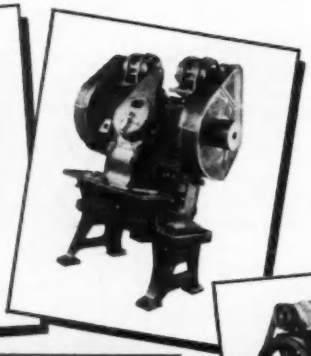
Whether it's a single press for a given job or a complete stamping plant, Bliss engineers welcome your inquiry. They will help you determine methods, production rates and costs without obligation.

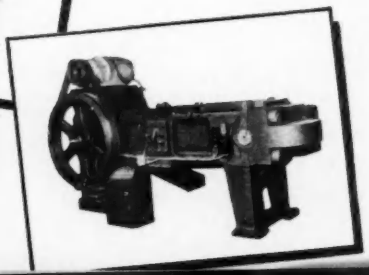
E. W. BLISS COMPANY, CANTON, OHIO

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery



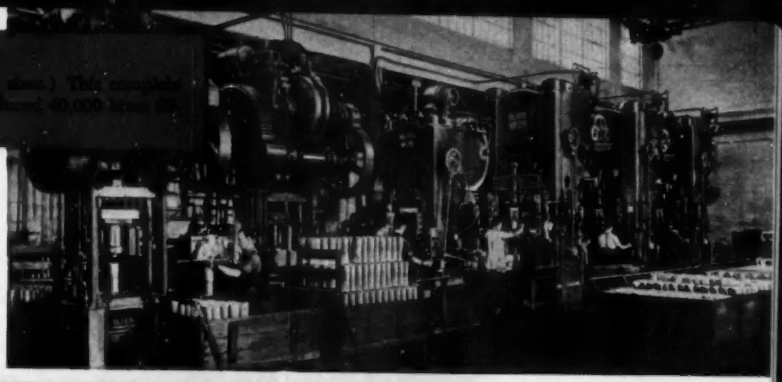






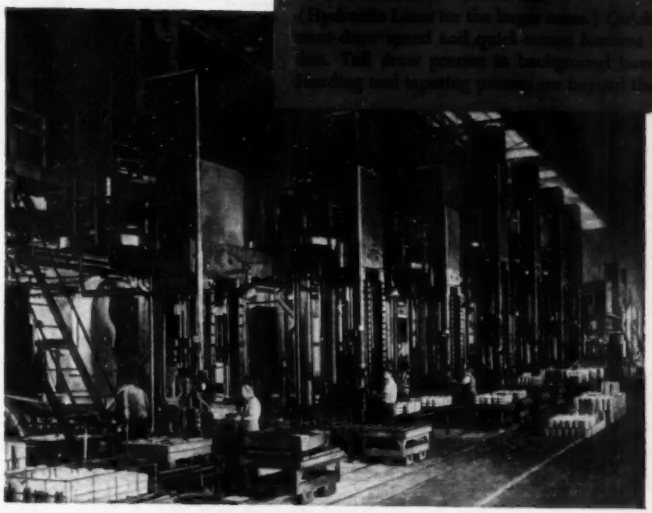
SMALL ARMS AMMUNITION

Bliss produced over 9,000 presses and special machines for all types of small arms manufacture in World War II.



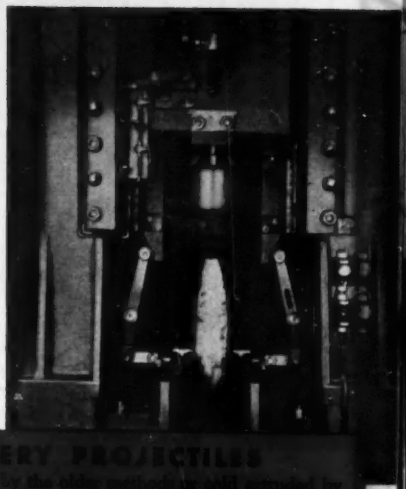
ARTILLERY CASES

(Mechanical Lines for the medium sizes.) This complete line of Bliss mechanical presses produced 40,000 brass shell powder cases a week.



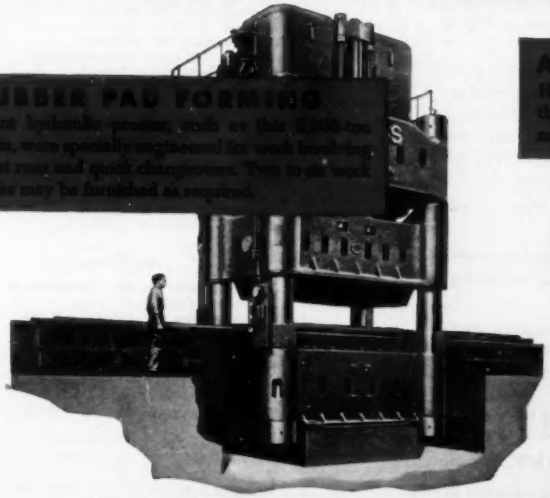
ARTILLERY CASES

(Hydraulic Lines for the larger sizes.) Quick advance, compound draw speed and quick return features speed production. Tall draw presses in background have 109" stroke. Heading and tapering presses are beyond them.



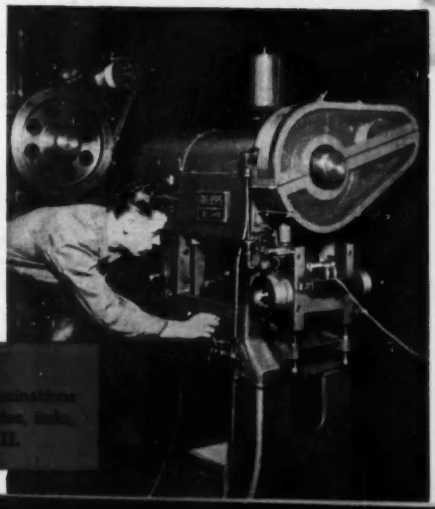
ARTILLERY PROJECTILES

Hot forged by the older methods or cold extruded by the newer methods, Bliss hydraulic or mechanical presses are available for the light, medium or the heavy sizes.



RUBBER PAD FORMING

Giant hydraulic presses, such as this 4,000-ton press, were specially engineered for work involving short runs and quick changeovers. Two or six work slides may be furnished as required.

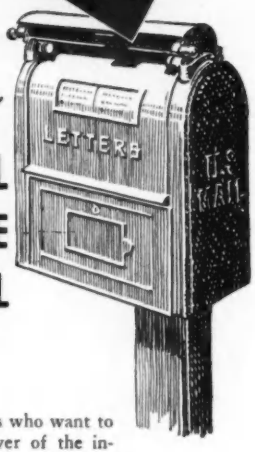


ELECTRICAL COMPONENTS

Hundreds of high production presses for motor laminations and ordnance parts like percussion caps, fuse plates, bullet cartridge clips, were built by Bliss in World War II.

Direct Route to
33,000 EXECUTIVES
IN 4567
AUTOMOTIVE
PLANTS

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Chilton
INDUSTRIAL
AUTOMOTIVE
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For Direct Mail users who want to reach the buying power of the industrial automotive field effectively and economically, Chilton maintains a Direct Mail Service, including:

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Chilton Direct Mail Service is complete, time-saving and tailor-made to fit your specific needs. For complete information, write today to

DIRECT MAIL DIVISION
CHILTON COMPANY
Chestnut and 56th Sts. Philadelphia 39, Pa.

AUTOMOTIVE HEADQUARTERS

Tax Writeoffs

(*Continued from page 94*)

— C —

Cobleir Products Co., Culver City, Cal.
Airframe machine parts—$64,935
Camden Machine Co., New Haven, Conn.
Jet engine parts—$14,500
Canton Drop Forging & Mfg. Co., Canton
Propeller extrusions—$114,306
Canton Drop Forging & Mfg. Co., Canton
Forgings (jet engines)—$250,000
Capital City Machine, Hartford, Conn.
Aircraft supplies—$13,710
Chrysler Corp., Newark, Del.
Military tanks—$15,973,900
Chrysler Corp., Detroit
Rear axle housings—$196,991
Cincinnati Gear Co., Cincinnati
Gears—$236,643
Cincinnati Gear Co., Cincinnati
Gears (Diesel, etc.)—$97,791
Cleveland Graphite Bronze Co., Cleveland
Aircraft parts—$561,699
Cleveland Pneumatic Tool Co., Cleveland
Airplane landing gear—$1,038,221
Collings Engr. Co., Inglewood, Calif.
Aircraft hardware—$95,000
Continental Foundry & Machine Co., E. Chicago, Ind.
Tank turrets—$192,711
Consolidated-Vultee, San Diego, Calif.
Airplanes—$139,600
Consolidated-Vultee, San Diego, Calif.
Airplane parts—$1,511,838
Consolidated-Vultee, San Diego, Calif.
Aircraft—$144,851
Consolidated-Vultee, Pasadena, Calif.
Wind tunnel testing—$3,985,007
Cook Electric Co., Chicago
Aircraft relay assembly—$267,043
Cooper Alloy Foundry Co., Hillside, N. J.
Jet engine burners—$243,358
The Cornelius Co., New Brighton, Minn.
Aircraft air compressors—$49,872

— D —

Dana Corp., Marion, Ind.
Transmission devices—$5,750,000
Detroit Kellering Co., Detroit
Aircraft engine mounts—$103,970
Deutsch Co., Los Angeles
Aircraft hydraulic fittings—$354,179
Deutsch Co., Los Angeles
Aircraft hydraulic fittings—$54,333
Dresser Industries, Bradford, Pa.
Steel rings for jet engines—$636,845

— E —

Eaton Mfg. Co., Battle Creek, Mich.
Blades for jet engines—$848,318
Euclid Road Machinery Co., Euclid, O.
Scrapers, loaders—$2,017,762
Extruded Hinge Co., Ypsilanti, Mich.
Aircraft hinges, etc.—$20,000

— F —

Fairchild Aircraft Div., Hagerstown, Md.
Airplanes—$71,456
Fairchild Eng. & Airplane Corp., Farmingdale, N. Y.
Aircraft engines—$5,979
Fairchild Eng. & Airplane Corp., Farmingdale, N. Y.
Ordnance—$11,202
Fairchild Eng. & Airplane Corp., Farmingdale, N. Y.
Aircraft engine parts—$2,414
Fairfield Mfg. Co., Lafayette, Ind.
Worm gears—$2,917,389
Fitzgibbon Boiler Co., Oswego, N. Y.
Hulls for tanks—$1,750,000
Ford Motor Co., Cincinnati
Oil pumps—$2,925,577

(*Turn to page 100, please*)

Here's Le Roi's sensational "Advanced Design" engine



...the most modern power plant available for heavy-duty trucks

Ask for this engine when you buy your new heavy-duty truck. You get 200 hp from a smooth-running, high compression V-8 engine — a sensationally new engine that gives you greater economy and longer life. Just look at these features:

- ★ Modern V-8, high-compression, valve-in-head design!
- ★ 207 horsepower — speed range, 800 to 3200 RPM
- ★ Lowest weight to horsepower ratio in the industry — only 6 lbs. per HP! You carry bigger payloads.
- ★ Most compact engine in its horsepower range—overall length only 43"!
- ★ Faster acceleration — quick response results from short stroke, light flywheel, and 8-cylinder power impulses!
- ★ Good high-speed performance — large bore and short stroke provide ample valve area. Unique combustion chamber shape having ample quench area retards detonation!
- ★ Smoother running engine at all speeds — extra rigidity of short box-like crankcase and five large main bearings reduce vibration!
- ★ Long life—replaceable, wet cylinder sleeves wear well, are inexpensive to replace. Stellite valves and seats and positive-type rotators promote long valve life—chrome-plated top ring adds extra miles between overhaul.

So, for better performance and lower operating costs, be sure your new heavy-duty trucks are powered with a Le Roi H-540. The coupon below will bring you a new H-540 catalog and specification sheet. Send for them today.

Condensed H-540 Specifications

Number of cylinders	8
Bore and stroke, inches	4½ x 4¼
Displacement, cubic inches	540
Horsepower, rated at rpm	207/3000
Weight bare, lbs.	1250

....Tear out this coupon and mail TODAY!....

LE ROI COMPANY, Dept. E-71B
1706 S. 68th Street, Milwaukee 14, Wisconsin

Please send me complete information on the "advanced design" features of your new H-540 engine for heavy-duty trucks.

Name..... Position.....

Company.....

Company Address.....

City..... (.....) State.....

LE ROI COMPANY
MILWAUKEE 14, WISCONSIN
Plants: Milwaukee • Cleveland • Greenwich, Ohio

E-71

Tax Writeoffs

(*Continued from page 98*)

Fuller Mfg. Co., Kalamazoo, Mich.
Automotive transmissions—$1,101,010

— G —

General Electric Co., Lockland, Ohio
Aircraft parts—$25,695,911
General Electric Co., Lynn, Mass.
Aircraft parts—$4,037,024
General Electric Co., Everett, Mass.
Aircraft parts—$647,689
General Electric Co., Louisville, Ky.
Parts for aircraft (jet engines)—$14,462,947
Genl. Lab. Association, Norwich, N. Y.
Aircraft ignition—$81,100
General Motors Corp., Vandalia, O.
Actuators—$277,781
General Motors Corp., Flint, Mich.
J-65 Sapphire engine—$45,725,450
General Motors Corp., Cleveland
Diesel engines—$1,744,282
General Motors Corp., Flint, Mich.
Assembly, sapphire engine—$22,856,200
General Motors Corp., Wayne, Mich.
Diesel engines—$1,317,893
General Motors Corp., Saginaw, Mich.
Ball bearing adjustors—$236,760
General Motors Corp., Flint, Mich.
Spark plugs—$40,275
General Motors Corp., Grand Rapids
Aircraft engine parts—$1,598,000
General Motors Corp., Harrison, N. J.
Roller bearings—$276,672
General Motors Corp., Vandalia, O.
Propellers—$180,655
Gitz Bros., Chicago
Aircraft parts—$3375
Goodyear Aircraft Corp., Akron, O.
Airplane wheels—$269,690
Goodyear Aircraft Corp., Akron, O.
Aircraft parts—$200,929
Goodyear Corp., Akron, O.
Fuel tanks—$216,694
Goodyear Tire & Rubber Co., Muncie Ind.
Tank tracks—$398,698
Goodyear Tire & Rubber Co., Akron, O.
Tank wheels & rollers—$322,855
Goodyear Tire & Rubber Co., Akron, O.
Aircraft parts—$32,978
Gould-Natl. Batteries, Chicago
Ord. & Aircraft batteries—$1,051,500
Gruman Aircraft Engr. Corp., Bethpage, N. Y.
Airplane wing parts—$88,825

— H —

Hansen-Lynn, Burbank, Calif.
Aircraft controls—$2200
Hartford Machine Screw Co., Windsor, Conn.
Aircraft engine parts—$426,213
Johns Hartford Tool Co., Hartford, Conn.
Aircraft engine parts—$8038
The Heim Co., Fairfield, Conn.
Special bearings—$20,878
Heintz Mfg. Co., Philadelphia, Pa.
Aircraft parts—$694,800
Heli Coil Corp., Danbury, Conn.
Bushings, tools, etc.—$244,429
Hot Point Inc., Milwaukee
Aircraft parts—$1,913,000
Howard Foundry Co., Chicago
Jet engine cases—$1,222,175
Hughes Aircraft Co., Tucson, Ariz.
Ordnance supplies—$7,289,000

— I —

Indiana Gear Work, Inc., Indianapolis
Aircraft gear units—$92,835
Inland Equipment Co., Nashville, Tenn.
Rocket head assembly—$56,534
Intercontinental Mfg. Co., Garland, Tex.
Aircraft assemblies—$12,428
Interstate Engrg. Corp., El Segundo, Calif.
Aircraft parts—$94,826
Island Machine Co., Farmingdale, N. Y.
Aircraft asemblies—$45,928

— J —

Jack & Heintz, Maple Heights, Ohio
Aircraft electrical equipment—$410,900
Jefferson Engr. & Mfg. Co., Detroit
Tank track parts—$118,782

— K —

Kaydon Engr. Corp., Muskegon, Mich.
Ball bearings—$463,048
M. W. Kellog Co., Jersey City, N. J.
Liquid rocket engines—$127,733
Kingston Products Co, Kokomo, Ind.
Tank truck pins—$49,146
Kingston Products Corp., Bronson, Mich.
Tank track shoes—$206,307
Knapp-Monarch Co., St. Louis, Mo.
Nose supports for tanks—$17,863

— L —

Lake Erie Engr. Corp., Tonowanda, N. Y.
Hydraulic presses—$271,758
Larson & Quigley Co., Chicago
Aircraft engine parts—$37,348
Lavelle Aircraft Corp., Newtown, Pa.
Engine mounts for planes—$135,574
Lebanon Steel Foundry, Lebanon, Pa.
Armor castings for tanks—$891,591
Link-Belt Company, Indianapolis
Track sprockets—$83,281
Lockheed Aircraft Corp., Burbank and Van Nuys, Calif.
Airplanes—$3,371,238
Lycoming-Spencer Div., Williamsport, Pa.
Throttle body assemblies—$20,675

(*Turn to page 102, please*)



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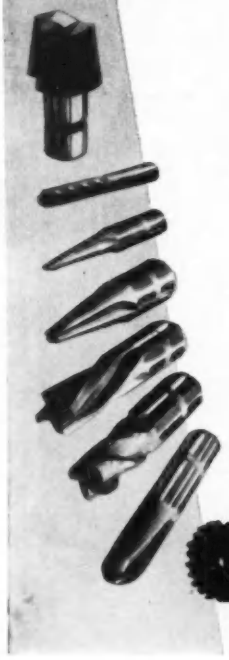
BOSTON — General Machinery Corp.
BUFFALO — Don W. Pearsons
CHICAGO — Neff, Kohlbusch & Bissell
DALLAS — Hunter Machine Tool Co.
DAYTON — Geniger Mach'y Company
DETROIT — A. C. Hoberkorn Mach'y Co.
FT. WAYNE — Ostis Machinery Co.
GRAND RAPIDS — Joseph Monahan
HAMILTON, ONT. — F. F. Barber Mach'y Company
HARTFORD — Herrington-Wilson-Brown Co.
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Tax Writeoffs

(*Continued from page 100*)

— M —

M.B. Mfg. Co., New Haven, Conn.
Aircraft engine fittings—$108,240
Manlove Mfg. Co., Los Angeles
Aircraft valves—$10,989
Marcus Mason & Co., Westboro, Mass.
Aircraft couplings—$83,071
Marlin Rockwell Corp., Plainville, Conn.
Aircraft parts—$1,104,965
Marvel Schebler Products, Decatur, Ill.
Aircraft parts—$796,112
Glenn L. Martin Co., Middle River, Md.
Aircraft—$76,496
McDonnell Aircraft Corp., Robertson, Miss.
Aircraft—$1,115,922
Mechanical Products Co., Jackson, Mich.
Circuit breakers (electric)—$159,857
Mechanics Univ. Joint Div., Memphis
Joint assemblies for vehicles—$270,000
Mechanics Univ. Joint Div., Rockford, Ill.
Joint assemblies for aircraft—$150,000
Menasco Mfg. Co., Burbank, Calif.
Landing gears—$1,013,634
Metal Fabricators Corp., Waltham, Mass.
Aircraft engine parts—$29,000
Minneapolis-Honeywell, Philadelphia
Instruments—$731,000
Minneapolis-Honeywell, Minneapolis
Electronic controls—$2,316,618
Minneapolis-Honeywell, Minneapolis
Auto-pilots, gyros—$3,788,000

— N —

Natl. Water Lift Co., Kalamazoo, Mich.
Aircraft parts—$47,803
New Hampshire Ball Brngs. Inc., Peterborough, N. H.
Precision ball bearings—$38,783
New York Air Brake, Watertown, N. Y.
Hydraulic pumps—$748,870
W. H. Nichols Co., Waltham, Mass.
Aircraft engine pumps—$202,934
Nordberg Mfg. Co., Milwaukee
Diesel engines—$3,694,409
Norma-Hoffman Brng. Corp., Stamford, Conn.
Instrument ball bearings—$350,000
Northrop Aviation, Hawthorne, Calif.
Aircraft—$2,046,100

— O —

Oceanside Mch. Shop, Plymouth, N. H.
Machining airplane parts—$43,619
Olin Industries, E. Alton, Ill.
Ordnance supplies—$1,015,315
Onsrud Machine Works, Inc., Chicago
Metalworking machines (aircraft)—$26,629

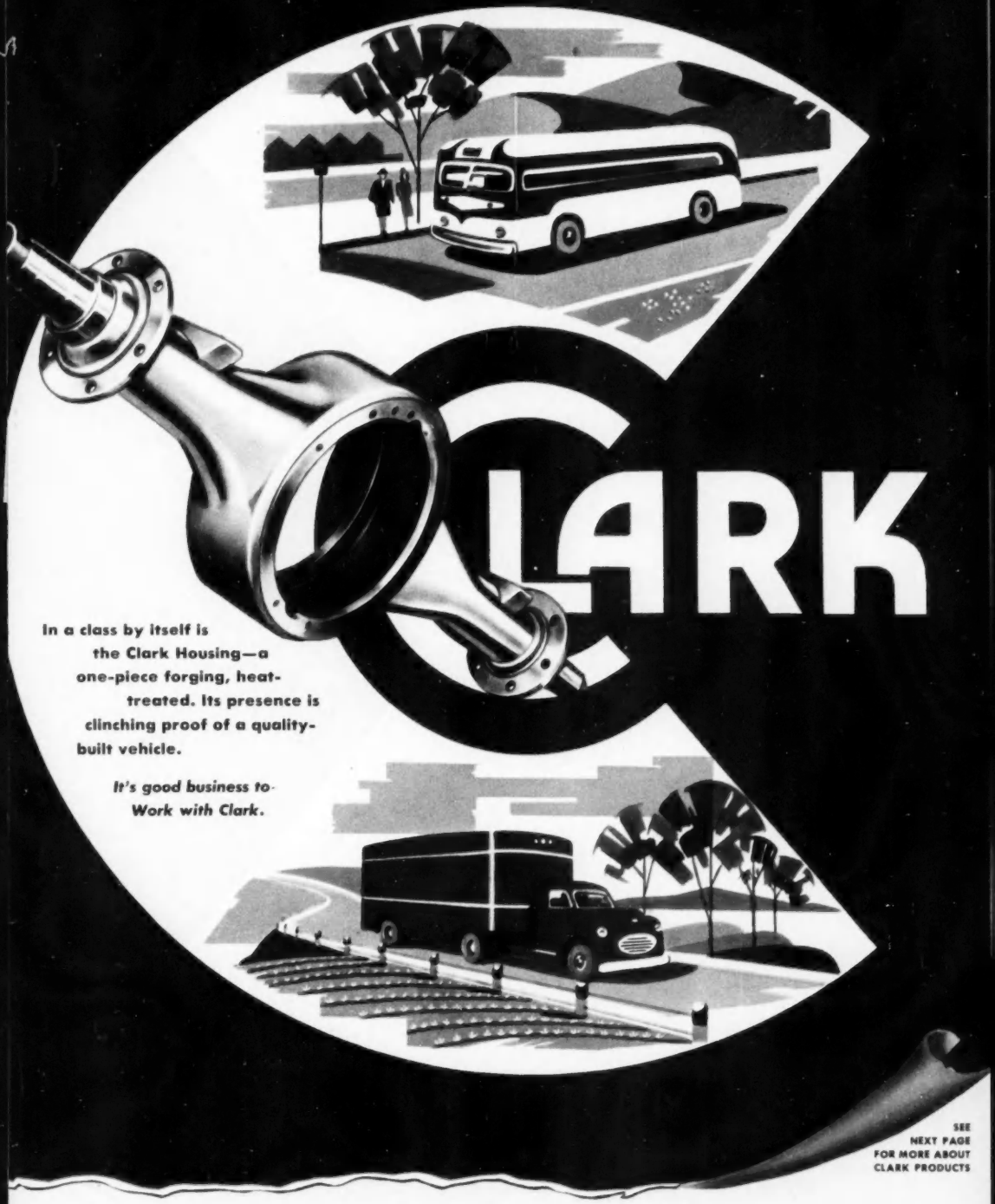
— P —

Pacific Piston Ring Co., Los Angeles
Aircraft valves—$30,303
Parker Appliance Co., Cleveland
Aircraft gaskets, seals—$503,221
Peerless Tool & Engineering Co., Chicago
Machining aircraft engine parts—$149,087
Pesco Products Div. Borg-Warner Corp., Bedford, O.
Aircraft accessories—$996,078

— R —

Raybestos-Manhattan, Stratford, Conn.
Clutch plates—$359,007
Republic Aviation Corp., E. Farmingdale, N. Y.
Aircraft—$5,166,139
Research Welding & Engineering Co., South Gate, Calif.
Tank assemblies and aircraft—$16,500
Rockford Aeromatic Prod. Co., Rockford, Ill.
Universal joint bearings—$33,000
Rohr Aircraft Co., Chula Vista, Calif.
Aircraft parts—$83,887

(*Turn to page 140, please*)



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Turbosuperchargers in Commercial Aviation

(Continued from page 39)

servatively rated to provide 4000 hp for take-off, or approximately 15 per cent higher power than the present powerplant and over 10 per cent reduction in fuel consumption. Test-stand operation has shown that even larger improvements in power and fuel consumption are possible. The new powerplant, therefore, provides advantages in range, payload, speed, and take-off distance.

These new developments in the field of turbosuperchargers, combined with a continuing design improvement program on the present models, indicate that turbos are making a major contribution in the progress of commercial aviation.

Surging in Centrifugal and Axial-Flow Compressors

By R. O. Bullock
and H. B. Finger
National Advisory Committee for Aeronautics

THE tendency toward high over-all compressor pressure ratios in our present-day turbojet engines, intended to improve the engine fuel economy characteristics, has imposed the problems of starting and accelerating which emphasize the need for understanding the surge phenomenon.

Compressor surge is an unstable flow condition characterized by pulsations of the flow that, besides causing appreciable power reduction, have in some cases caused engine failures. It is therefore apparent that engine operation in this region is not permissible and means must be found to avoid such unstable operation.

The principal conclusions that have resulted from this investigation are:

(1) The compressor surges as a unit with the flow pulsating at the same frequency throughout.

(2) Surging may actually be only one of many undesirable manifestations resulting from attempt to operate a compressor beyond the envelope line of its potential performance curve.

(3) Stall of any given stage in an axial-flow compressor is not a sufficient condition for surge; because a positive slope appears to be a definite criterion for instability, the increase in the algebraic value of the operating slope of any stage is to be avoided.

(4) A universal cure-all for surging does not exist at the present time, but ingenious application of the fundamental knowledge now available should permit definite improvements to be made in the off-design operation of any given compressor.

Flight Characteristics of the Boeing B-47 Stratojet

By Robert M. Robbins
and William H. Cook
Boeing Airplane Co.

FLIGHT testing of the Boeing B-47 Stratojet has been a very interesting program because of many new handling characteristics, and also because the swept wing jet has taken us to new horizons in bomber performance.

Stalling characteristics were supposedly bad on swept wings. Since no time was available for flying scale models, careful attention was given to wind tunnel tests. These determined the design of airfoil sections and slats, and demonstrated the importance of proper nacelle location. The large dihedral effect of swept wings at slow

(Turn to next page, please)

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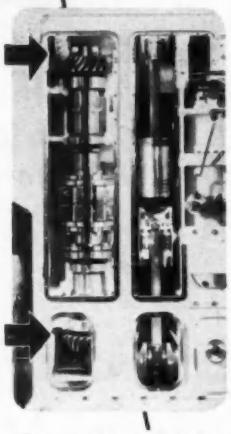
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speeds also was shown to be a possible source of difficulty, particularly on cross wind landings. The satisfactory solution on the B-47 was the use of a powerful lateral control with flaps down.

Most large airplanes which do not limit the amount of elevator control have rolling tendencies in the extreme stall. This is also true on the B-47. However, since powerful lateral control is available and the pilot was able to hold the wings level by rapid control movements, the wing got down to 30 deg in only a very few instances. During an extreme stall there is so much buffeting in the B-47 that it is hard to conceive of this small amount of roll having any practical significance. Pitching in a full stall is mild. No loss in altitude occurs on approaches to stall warning when followed by proper recovery. A large loss in altitude does, of course, occur on complete stalls, as is true on all heavily-loaded airplanes. Because of the good stalling characteristics that exist without wing slats, they are being eliminated on production airplanes. Removal of the slats, which were provided for insurance against possible poor stalling characteristics, will save approximately 600 lb and simplify maintenance and manufacture of the B-47. The slats are typical of one of the features incorporated so that positive control of the airplane's characteristics would be assured — the "brute force approach." This one feature proved unnecessary.

Flight Experience With Turbine Propeller Powered Aircraft

By R. C. Loomis and E. D. Shannon
Consolidated Vultee Aircraft Corp.

THE problem of keeping turboprop shaft torque within reasonable limits has been solved in recent installations by coordinating the power and speed controls through a single lever and limiting the propeller blade angle change rate in the normal operating range. Excessive torques are prevented from occurring at feathering by simultaneously feathering the propeller and shutting off fuel to the turbine.

Excellent thrust response characteristics throughout the entire range from full reverse to full take-off power have been obtained by means of electronic valving of the propeller hydraulic control and coordinating the propeller speed with the turbine power schedule. Hunting and surging of speed and torque experienced in early turboprop installations have been eliminated in recent installations.

Starting a turboprop has become a simple and rapid operation as a result of using an air motor starter powered by bleed air from the compressor section of a small auxiliary free running turbine.

High windmilling drag is an inherent characteristic of turboprop power-

(Turn to page 108, please)



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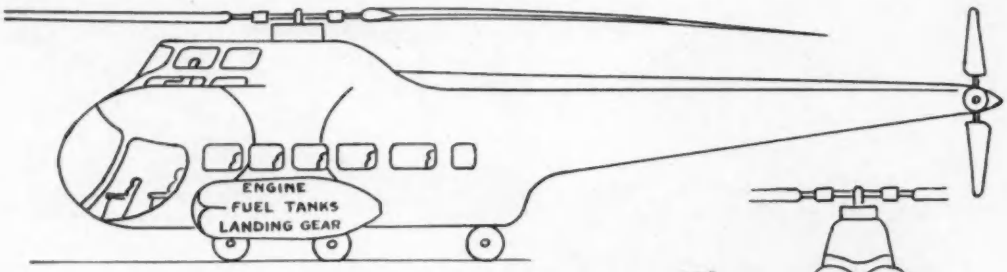
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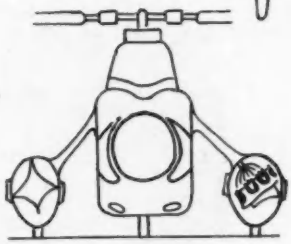
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This passenger helicopter proposal was put forth in a paper, "Helicopters Applied To Local Air Service Operation — American Plan", by C. M. Belinn, president, Los Angeles Airways, Inc. The following specifications were given: Airspeed at sea level — 125 mph; gross weight — 16,000 lb; passenger capacity — 16 to 24; powerplants — two 800-hp R-1300; fuselage length — 55 ft; fuselage width — 9½ ft; height overall — 18½ ft; rotor — 73-ft diam. An interesting feature is the use of the landing gear nacelles as an engine and fuel tank housing.

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SPECIAL APPLICATION FRACTIONAL HORSEPOWER **MOTORS**

plants and such drag becomes very hazardous when encountered during take-off or landing. Practical turboprops must therefore incorporate a completely reliable propeller autofeathering device which is usable for both take-off and landing regimes. In addition, mechanical low pitch blade angle stops must be incorporated for the in-flight operating condition.

Turboprops use reduction gear ratios as high as 15 to one and at the same time require turbine speed control accuracy of approximately plus or minus 50 rpm in 10,000 rpm, or a total tolerance of one per cent. Thus, propeller governors must be very accurate and reliable if satisfactory flight characteristics are to be achieved. Propeller speed synchronization is a mandatory requirement on multi-engine aircraft.

Asymmetric thrust on multi-engine turboprop aircraft can become excessive during throttled landing approaches and results from the high idle speeds required for turbine acceleration. This condition should be corrected by incorporating positive mechanical low pitch blade angle stops in the propeller, synchronizing propeller speeds, and coordinating fuel and propeller speed schedules so that large changes in power output do not occur for small changes in turbine speed.

Compressor blade damage from foreign material, turbine burner quench out from water, and compressor blade icing possibilities all require that special attention be paid to the air entrance ducting on turboprop engines.

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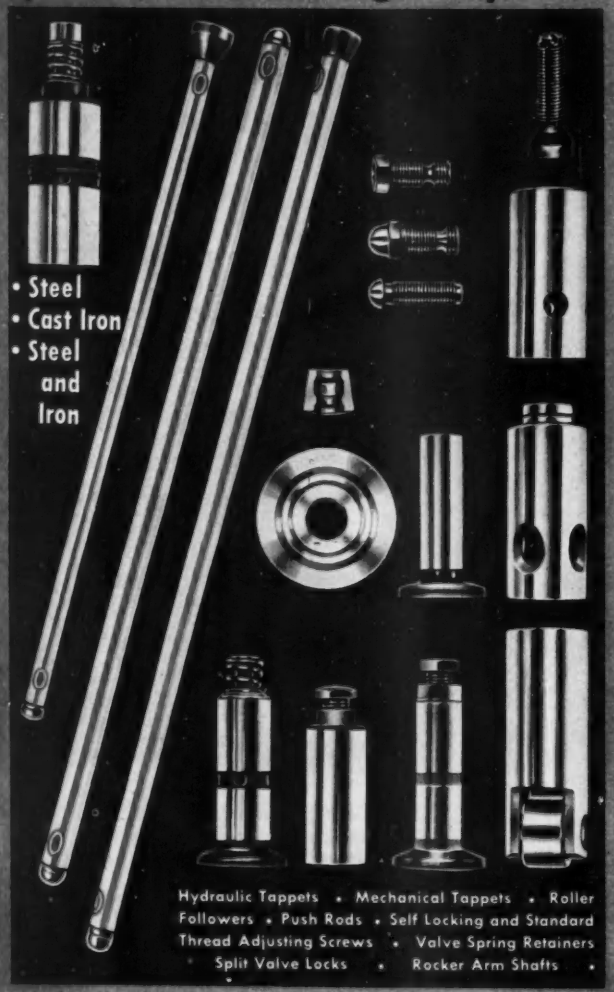
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Amer. Society for Quality Control, Cleveland .....May 23-24

Third World Petroleum Congress, The Hague, Scheveningen, Holland .....May 28-June 6

SAE National Summer Meeting, French Lick, Ind. .....June 3-8

American Gear Manufacturers Assn. (Annual Meeting), Hot Springs, Va. .....June 4-6

American Society of Mechanical Engineers semi-annual meeting, Toronto, Canada .....June 11-15

American Society for Testing Mat'ls Annual Meeting, Atlantic City, N. J. .....June 18-22

SAE National West Coast Meeting, Seattle, Wash. .....Aug. 13-15

First European Machine Tool Exhibition, Paris .....Sept. 1-10

SAE Tractor and Production Forum, Milwaukee, Wis. .....Sept. 10-12

Sixth National Instrument Conference and Exhibit, Houston, Texas Sept. 10-14

American Society of Mechanical Engineers (fall meeting) Minneapolis, Minn. .....Sept. 25-28

Nat'l Metal Trades Assn., Chicago, Ill. .....Sept. 26-28

Sixth Annual Industrial Packaging and Materials Handling Exposition, Cleveland, Ohio.....Oct. 1-4

SAE National Aeronautic, Production Forum, And Display, Biltmore Hotel, Los Angeles, Calif. ....Oct. 3-4

National Metal Congress and Exposition, Detroit, Mich. ....Oct. 15-19

SAE National Diesel Engine Meeting, Drake Hotel, Chicago, Ill. ...Oct. 29-30

SAE National Transportation Meeting, Knickerbocker Hotel, Chicago, Ill. .....Oct. 29-31

SAE National Fuels and Lubricants Meeting, Drake Hotel, Chicago Ill. .....Oct. 31-Nov. 1

American Petroleum Institute (31st Annual Meeting), Chicago, Ill. Nov. 5-8

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SAE Annual Meeting, Detroit, Mich. .....Jan. 14-18

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"Our experience with Wagner Air Brakes has been very satisfactory. They have what it takes to operate efficiently in tough, over-the-road service."

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"For the job they have to do—for freedom from maintenance—for all around dependability—Wagner Air Brakes are our best buy for our operation in the St. Louis trading area."

—WESTERN TRUCKING COMPANY, INC.

"Wagner equipment had to be good to justify the fact that over 85% of our fleet of more than 1200 buses is equipped with Wagner Air Brakes. Their reliability and dependability have contributed considerably in helping us save many maintenance dollars."

—ST. LOUIS PUBLIC SERVICE COMPANY

"Already our compressors have operated 35% more mileage than other types without overhauling and there is no indication that overhauling is immediately apparent or even necessary. Our operation with these compressors, since arrival on the property, has been absolutely troublefree. In this day of high operating costs, such statements are the exception rather than the rule."

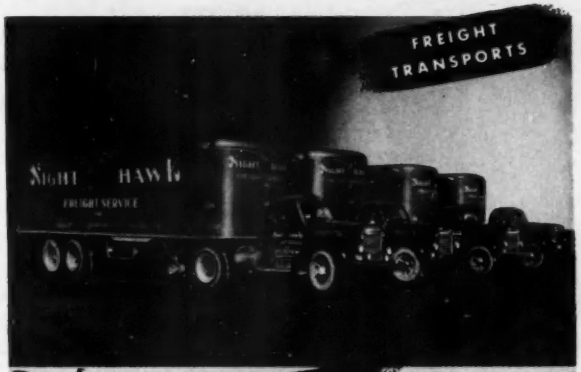
—WICHITA TRANSPORTATION CORPORATION

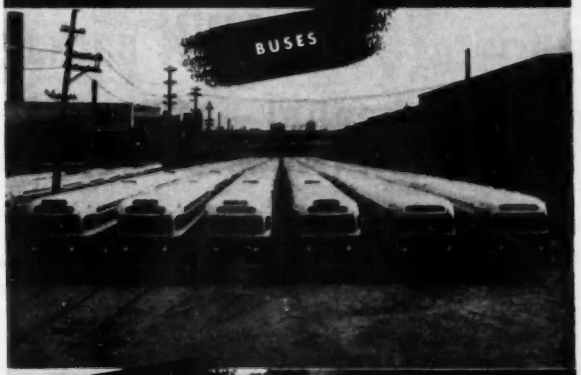
"In the past two years, each unit we operate has traveled over 100,000 miles and the air compressor maintenance costs have not been more than $1.50 for the six buses we operate."

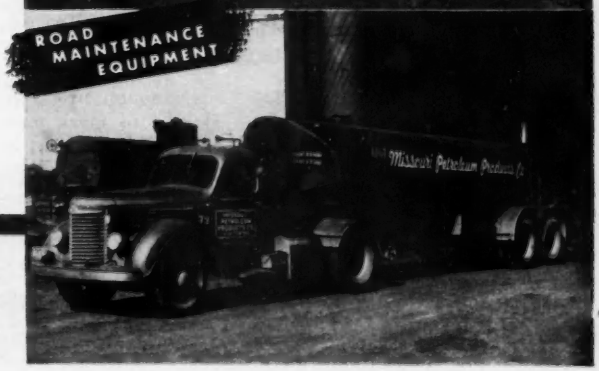
—INTERSTATE TRANSIT CORPORATION

"We believe we can safely say that our trucks receive tougher treatment than that given most vehicles in over-the-road operation. Long and heavy hauls over all types of terrain are all in a day's work. When it came to the selection of brakes, all of these conditions were considered. We made the right choice when we selected Wagner Air Brakes."

—MISSOURI PETROLEUM PRODUCTS COMPANY





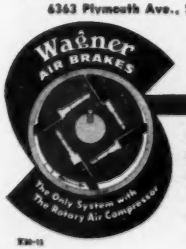


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KU-51

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Gears of Exceptional Quality

(Continued from page 44)

intricacy, having a six-spline helical bore and a shifting collar. Made from drop forgings of SAE 4640 fine grain steel, the parts are bored and reamed in a chucking machine, the spline bore being green-broached in an Oilgear broaching machine. The part is then rough-turned and finish-turned in two 12-in. Fay automatic lathes.

Next follows the semi-finish cutting of 29 helical gear teeth of 8-10 DP in No. 8-10 Barber-Colman vertical type hobbers. Possessing adequate power and rigidity, these machines make it possible to use triple-lead hobs which are instrumental in boosting productivity. Gear teeth then are rounded in a No. 50 Gross chamfering machine.

Following washing in a Blakeslee Niagara washer, and burring, the gear teeth are finish-crown-shaved in National Broach gear finishers, using a modified circular cutter.

Work is washed again, placed in suitable fixtures, and transported to the heat treating department for gas carburizing. Carburizing is done at a temperature of 1500-1550 F to obtain a case depth of 0.006-0.008 in., then quenched in oil. It is also tempered to secure hardness ranging from 52-57 Rc (min.). After washing, the gears are processed through a Tocco induction heating machine to draw the internal spline to a hardness of 30-40 Rc to permit final hard broaching of splines. This operation, performed in an Oilgear broach holds maximum depth of spline to 1.645 in. plus 0.0000, minus 0.0015 in.

Final operation is the grinding of the groove in the collar for the sliding fork. This is done in a J & L thread grinder converted for use as a form grinder. Using a special formed wheel, it is possible to finish-grind the groove with a single plunge cut.

The clutch shaft presents some intricate machining problems since it combines a splined shaft with a 19-tooth helical gear together with stepped bores and clutch teeth. It starts as a drop forging of SAE 4640 fine grain steel, milled to length, centered, then turned in two settings in Fay automatic lathes. The helical gear OD as well as the two bearing diameters then are surface shaved to finished size in a special Red Ring Roto shaving machine.

These preparatory operations are followed by drilling, chamfering, forming, and green grinding of the thrust face and stem. Gear cutting is done in Fellows gear shapers. The first operation is to finish shape the outer group of 24 teeth, then the semi-finish shaping of the 19 helical gear teeth.

Next follow—cutting of the snap ring groove, chamfering the 24 teeth in a Cross machine, washing, and finish cutting of 10 straight splines on the stem end in Barber-Colman and G & E hobbers.

At this point the 19 helical gear teeth are finish-shaved in a Red Ring machine, washed, and prepared for heat treatment. This is done in Holcroft gas carburizing furnaces where the work is held for 1½ hours at 1500-1550 F, quenched in hot oil, and tempered at 375 F for 1½ hours. Hardness of gear teeth is held to 52-57 Rc.

The shaft is straightened and made ready for a schedule of finish grinding operations which include: grinding of the bearing, oil seal, and pilot diameters; grinding the seven deg and 25 deg angles in Norton grinders; and grinding the ID in a Heald internal grinder. The seven deg taper at the end is super-

(Turn to page 116 please)



Imprint YOUR OWN packages

faster—cheaper—at less cost with MARKEM Box Printers

A Markem machine in your plant lets you imprint information such as your trade mark, variable facts about size, style, stock number, etc., on cartons, flat boxes, envelopes, and labels. Best of all, you can change imprints and color in only seconds.

Consider these advantages the Markem Box Printers give you: (1) No bulky inventories of preprinted stock because you mark the exact quantities when and as you need them. (2) Marking with Markem equipment gears right in with your production line—because you imprint cartons, envelopes, etc., as you assemble and fill them, which is the most economical way. (3) Clear, crisp imprints, readable at a glance, are possible with Markem Box Printers. The printing area can be as large as 11"x3".

Here is a commonsense, economical way to mark your boxes, envelopes, cartons or labels. Write today for full details about this efficient, easy-to-use and money-saving machine.

Keene 26 MARKEM MACHINE COMPANY New Hampshire

"THIS HAS BEEN A PROFITABLE VISIT," said Mr. Jenkins



Not long ago Mr. Jenkins, a customer, took a swing through our newly enlarged factory. "Naturally, I know you make bearings, our Company has been using them for years," he remarked, as we showed him around, "But I never realized how many products other than bearings adapt themselves to your facilities . . . those intricate parts there, for instance . . . I can see you must maintain a great many tools." We allowed he was right as we showed him our tool cage that houses enough dies to make over 2000 different sized items for industry.

As we headed back to the main office, Mr. Jenkins shot a sweeping glance over the shop machinery. "Well!" he exclaimed, "this has been an enlightening and profitable visit. I have a hunch you could make many of our component parts cheaper than we make them ourselves." We agreed, because we've been doing just that for many of the giants of American industry year after year.

It might surprise YOU, too, to see how complete and versatile our equipment really is—to know how many ways it can serve you profitably. We would enjoy having you visit our plant . . . or in being asked to talk things over at your plant. Aetna Ball and Roller Bearing Company, 4600 Schubert Avenue, Chicago 39, Illinois.

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Standard and Special Ball Thrust Bearings • Angular Contact Ball Bearings • Special Roller Bearings • Ball Retainers • Hardened and Ground Washers • Sleeves • Bushings • Miscellaneous Precision Parts.



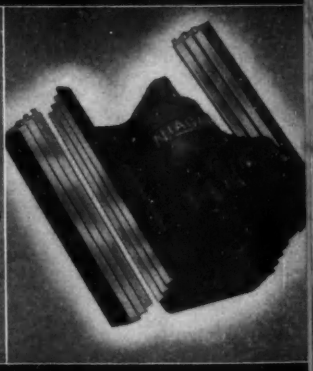
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● You get the same advanced design in small Niagara Inclinable Presses as you get in the largest sizes. Don't overlook the importance of this because small presses run as much as 6½ times as fast as large presses. Regardless of size you get quality when you get Niagara Inclinable Presses.

Instant Engagement of the Sleeve Clutch as compared with the slower action of other mechanical press clutches produces more work strokes per hour.

Multiple "V" gibs provide more guiding surface which minimizes wear, maintains alignment of slide with bed and thus increases die life.





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NIAGARA

SMALL INCLINABLE PRESSES

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BIG PRESS FEATURES

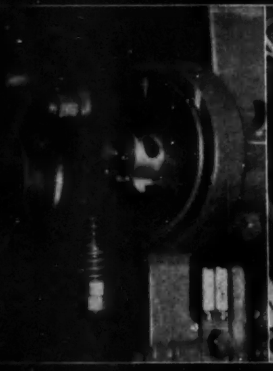
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Brake automatically compensates for wear as well as expansion due to heat of operation. Drum and band marked to indicate correct adjustment.

Slide designed to assure solid backing for die from center to front as well as rear. Breech block die clamp gives solid backing to punch shoe.

Frame designed to provide solid gib mountings, strength at the crankshaft bearings and a rigid gap maintaining close alignment of punch and die.

Inclining mechanism easily operated by one man. Working height is not materially changed when press is inclined.









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Lord Mountings make the day's work easier for drivers, make the day's travel pleasanter for passengers, and make the journey safer for both. They postpone the day of repairs and replacements and reduce the costs of upkeep.

When you plan new buses, new trucks, new cabs, be sure that Lord Mountings are in the drawings and the specifications . . . make them a part of design. No other expenditure you make will bring as great returns from so small an outlay. Here are some of the places where Lord Mountings will serve you profitably:

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- **Radiator Mounts**
- **Instrument Mounts**
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Write for your copy of the Lord Natural Frequency Chart and of the Vibration Isolation Chart. Designers and engineers will find them of definite value.

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LORD BONDED RUBBER — Vibration-Control Mountings . . . Bonded-Rubber Parts

finished in a Gisholt machine to five microinch, while the oil seal diameter is held to a surface finish of 15 microinch.

It is noteworthy that in keeping with quality control, each of the Red Ring gear shavers has been equipped with the Barnesdril magnetic separator to keep the cutting fluid clean and free from even minute particles which might ordinarily mar the finish of gear teeth. This also contributes to longer shaving cutter life.

It is also of interest that the Fellows gear shapers used for cutting the clutch shaft have been modified by the introduction of a special external work holding device which is designed to hold the shaft on centers rigidly and in accurate alignment during the shaping cycle. This feature is instrumental in maintaining high gear quality and axial alignment.

Publications Available

(Continued from page 58)

A-137 Force Indicator

Hunter Spring Co. — A four-page bulletin, just published, includes for the first time engineering specifications on all 12 models of the Force Indicator, a precision instrument.

A-138 Trucks

International Harvester Co. — The Motor Truck Div. of IHC has issued two six-page, two-color catalogs describing heavy duty, Diesel powered trucks.

A-139 Welding

Electrode Div. of The McKay Co.— "The Welding of Stainless Steels," a new 48-page handbook just published, describes in complete detail all phases of stainless steel arc welding.

A-140 Machine Tools

Giddings & Lewis Machine Tool Co. —Ready for immediate distribution are individual bulletins on three new G. & L. machines, one on their new 54 in. to six ft heavy Hypro vertical boring and turning mill and also a 20-page bulletin describing accessories and attachments for horizontal boring machines.

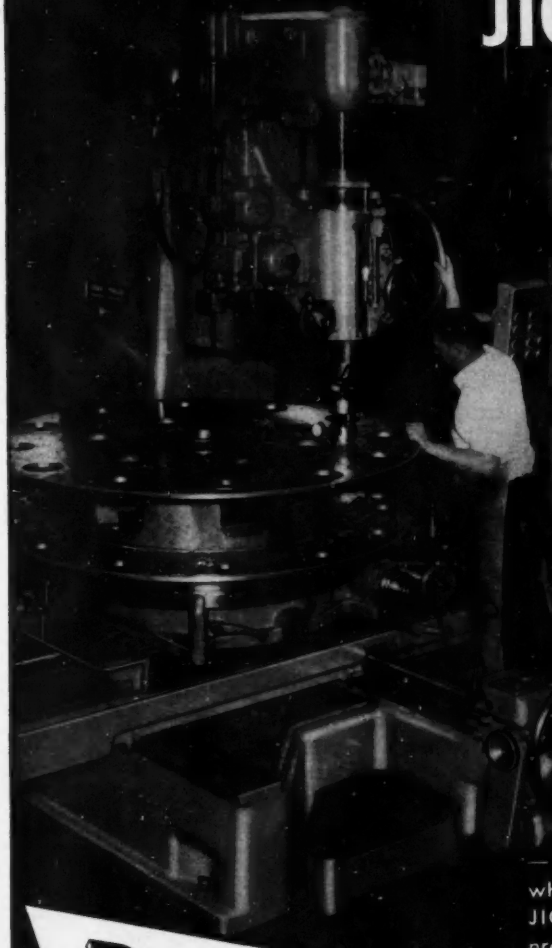
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"There's no better-paying Investment than the Right Tools for the Job"

Automotive Activities in Italy

(*Continued from page 33*)

and service organizations exist by reason of the number of cars which have been sold in diplomatic circles. All foreign makers are free to sell to diplomats and Italy is particularly favorable in this respect for each nation has two embassies at Rome, one to the State, and the other to the Vatican.

Italy, with its nine manufacturers of passenger cars, plus a big truck, coach and body building industry, is now in full and increasing production, with a record output last year of 127,847 vehicles, of which 21,905 were exported.

Because the production program is getting under way, there are practically no new models, the only exception being the Lancia Aurelia as a long-distance touring type. This follows the same general lines of construction as the model brought out last year, with complete light-alloy, V-type six cylinder engine, transmission at the rear, independent suspension all around and one-piece, all-metal body. Engine size, however, has been increased to 2.83 in. bore by 3.2 in. stroke, compared with 2.76 in. by 3.0 in. for the standard model. This increases the output from 56 hp at 4700 rpm to 75 hp at 5000 rpm. At the same time the wheelbase had been reduced from 112½ in. to 105 in. and changes have been made in the final gear ratio. Convertible or closed bodies are offered. By reason of the design and an extensive use of light alloys, the weight is only 2180 lb. Lancia presented this model as a two-door sedan and as a two-door convertible. There is no intention of dropping the 107 cu in. engine.

Fiat's program is settled, for the time being, with three main types: The small two-passenger 500 C, the 1100 model and the 1400. Output at the present time is 250 of the 500 model, 150 of the 1400, and about 100 of the 1100 per day.

Occupying the largest stand in the show, Fiat's popular attraction was a talking and self-operating car. Mounted on a pivot, the doors were opened, a lour speaker announced that the passengers were getting in, the engine was started, lights switched on and windshield wiper operated, then the wheels began to revolve, and the car gave the impression of running on the level, climbing hills, and making turns. When it came to a stop, the doors opened for the passengers to descend and the voice announced that the trip was over.

A light truck has been added to the Fiat line, the Model 615, employing the same engine as in the 1400 passenger car, the units being mounted in a standard type chassis, which has coil spring independent suspension in front and a conventional axle and semi-elliptic springs at the rear.

Alfa-Romeo's latest line is the 1900 with a four cylinder overhead camshaft engine of 110 cu in. which supplements the six cylinder models the firm has produced for some time. This car had already been shown at Paris and Geneva.

Maserati, of Modena, presented two models, one with a six cylinder engine of 90.6 cu in., the other a six of 122 cu in., both with overhead camshafts. In addition, there was a light delivery truck with a vertical two-cylinder, two-stroke engine, forming a unit with the clutch and four speed transmission. The firm is continuing the production of a limited number of racing cars, most important being a 91½ cu in. four-cylinder with two-stage supercharger.

O.S.C.A. offered a four cylinder sports sedan that weighs only 1500 lb complete with spare wheel. It is powered with a four cylinder, two camshaft engine of 2.95 by 2.99 in. bore

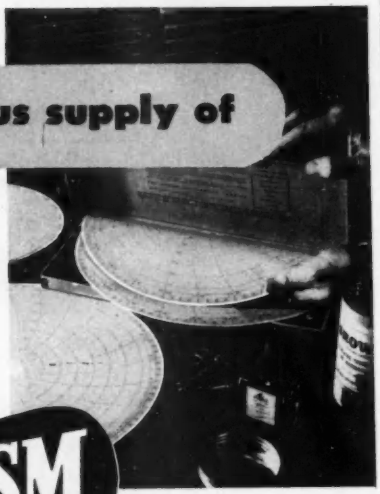
(*Turn to page 120, please*)

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The Holley-designed and Holley-built water-proof carburetor and governor are standard equipment on the "Eager Beaver."
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IF YOU WANT TO
ELIMINATE GASKETS
ON PARTS
LIKE THIS...





...INVESTIGATE
LAPPING ON A
LAPMASTER

Expensive gaskets for this 9⅝" long, intricate cast aluminum body have been eliminated with a 48" Lapmaster by lapping the joint surface flat to an all-over light band pattern. Pressures up to 3500 psi can be sealed when mating faces (of sturdy pump parts) are lapped to this tolerance.

The Lapmaster 48" readily handles large and small parts of a wide variety of shapes and materials in production runs. *This machine does not require conditioning of the lap plate, it uniformly distributes "wet" lapping compound, and it operates with practically no maintenance.*

96 Parts Lapped Per Hour

Production on the valve body part shown above is maintained at the rate of 8 parts per five minute cycle. The machine is equipped with 4 lap-conditioning rings each holding two parts.



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and stroke, developing 90 hp at 6600 rpm. This can be increased to 98 hp with special fuel and a compression ratio of 12 to 1. Camshafts are driven by a train of gears and two Weber carburetors are fitted. A smaller engine of 2.75 by 2.79 in. bore and stroke is similar in design and is stated to develop 75 hp at 6800 rpm. In both cases the engine is carried in a tubular frame with independent suspension front and gear.

The 12-cylinder O.S.C.A. is a 272 cu. in. non-supercharged engine of 3.07 in. bore and stroke. It has overhead camshafts and two inclined valves per cylinder. Three downdraft Weber carburetors are used and a Marelli magneto for each bank of six cylinders. With a compression ratio of 11.5 to 1, the output at 5600 rpm is 295 hp. A second edition of this engine is being produced for fitting in a single-seater racer and competition car. The O.S.C.A.'s are all built to the designs of Alfredo Maserati.

Italy gives more attention to automobile racing and sporting events than any other country in the world, and while a few firms build racing cars only, almost all have high-speed sports models. The exception is Fiat, which does comparatively little in this line, leaving it to the smaller firms to adapt its units for speed work. Ferrari is outstanding with a V-twelve made in three models, with piston displacements of 142, 155, and 250 cu in. Although closed cars are offered, they are designed along racing lines, with light alloy, overhead camshaft engines running at 6000 and 6500 rpm, and compression ratios of 7.5 and 8 to 1. The frames, which are produced by Gilco, are welded steel tube construction, the side rails being round section in front, then merging into oval section, with a cruciform cross member and round section transverse tubes front and rear.

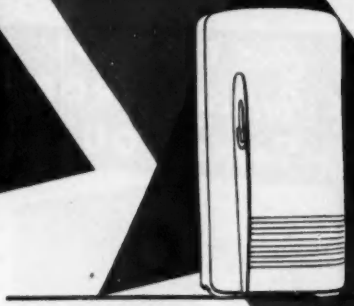
Probably the lightest racing car in the show was the Nardi 45 cu in. flat twin, which in chassis form was stated to weigh 488 lb, and 748 lb with two-passenger racing body. It has an all tubular frame. The air-cooled, valve-in-head opposed engine is really a development of the BMW, with light-alloy cylinders and head, and a carburetor for each cylinder. It is claimed to develop 48 hp at 6500 rpm. A light-alloy gasoline tank at the rear feeds to a small gravity tank at the front, with an overflow to the main tank. The Nardi is used most extensively for hill-climbing events.

Body design formed one of the most outstanding features of the Turin show, there being in Northern Italy about fifty small and medium-sized firms specializing in custom-built bodies. Apparently there is a demand for these special designs, for no sooner is a new model announced by one of the three big firms—Fiat, Alfa-Romeo or Lancia—than the specialists have a special body for it. In some cases the chassis is modified, but most of the body

(*Turn to page* 122, *please*)



Cold Facts about cutting costs



In the highly competitive field of domestic refrigerators, it is especially necessary that costs be controlled and kept to a minimum. That's why the Seeger Refrigerator Company at St. Paul, Minnesota, installed this 400 ton Clearing press to turn out their refrigerator door panels. They knew they would get uniform panels, and also obtain effective, steady press operation with the smallest amount of down time for die or press maintenance.

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THE WAY TO [illegible] PRODUCTION

CMC CLEARING

builders prefer to leave the chassis alone and mount one of their own creations on it.

So far as general lines are concerned, there is a uniformity in Italian automobile bodies, all being of the pontoon type, with front fenders merging almost imperceptibly into the hood, a fixed rounded windshield, a rear window of the same shape and almost equal dimensions and very simple bumpers. Individuality between makers really lies in the radiator grille treatment and in details. There is a very strong tendency towards two doors, even for five-passenger bodies.

Another tendency is towards close-coupled, five-passenger convertibles, with two doors, but having the rear cushion removed and the platform designed to receive specially-built trunks. An example of this was shown by Ghia, using the Fiat 1100 mechanical units with a two-door body carrying the baggage inside. An original and pleasing note was struck by an unbroken black panel from behind the front wheel to the tail, the hood and the upper deck being in cream. In the standard convertible 1400 Fiat uses only two doors, although the sedan is a four-door type.

Italian Automobile Production and Exportation

Year	Units built	Units exported	Registrations §
1938	70,777	20,240	370,988
1945	10,290	.....	.....
1946	28,983	2,863	410,903
1947	43,736	10,605	537,032
1948	59,953	14,117	598,063
1949	86,054	17,536	678,821
1950	127,847	21,905	955,000

§ All vehicles except light motorcycles.

The British alone increased power plant accessibility by constructing hood and fenders in one piece and hinging the whole. Aston-Martin had the hinges forward, while on the Jowett Javelin they were at the rear.

German participation comprised Mercedes-Benz, Volkswagen, Borgward, and Opel, all with models which had been seen at previous exhibitions. Mercedes-Benz featured a passenger car with a four-cylinder Diesel engine.

Occupying more space than the passenger cars and more important than the trucks were the Italian buses and coaches. Doubtless the country's attractions for foreign tourists explained the big quantity of sight-seeing coaches, many of them designed for long-distance service. Operational economy has led to the use of trailers and semi-trailers both for freight and passengers. Outstanding in the trailer bus class was the Viberti consisting of a two-axle-tractor and a single-axle trailer, of equal length and carrying capacity, the two forming a combination 59 ft in length, weighing 13 tons and carrying a useful load of 11 tons. An outstanding feature of the Viberti is the system of articulating the trailer on the tractor, with practically no lost space, the turning radius being 30 ft, with wheelbases of 18 ft between front steerers and live axle and 25 ft between live axle and the rear pair of steerers. Viberti usually makes use of the Fiat six-cylinder Diesel, with a four-speed transmission having a relay, giving eight forward combinations and two reverse ratios.

A road train of the same general type shown by Officine della Stranga had 22 individual seats, convertible into the same number of beds—upper and lower berth.

The Gar Wood Air Coach was represented by the Casaro Tubocar in three models: Inter-urban, touring and long-distance touring. This usually carries the Alfa-Romeo transversely mounted six-cylinder Diesel with an eight-speed transmission. One of the latest models had the Fiat Diesel set transversely at the rear, but inclined to reduce height. An Italian frameless coach was the Siccara, made in two models for 42 or

(*Turn to page* 124, *please*)



THREE STEPPING STONES TO A FIRM POSITION IN A COMPETITIVE MARKET . . . The above equipment—designed to specifications laid down by metallurgical engineers in the automotive industry—is also engineered for universal applications and continual tooling changes due to parts revisions from one year's model to the next.

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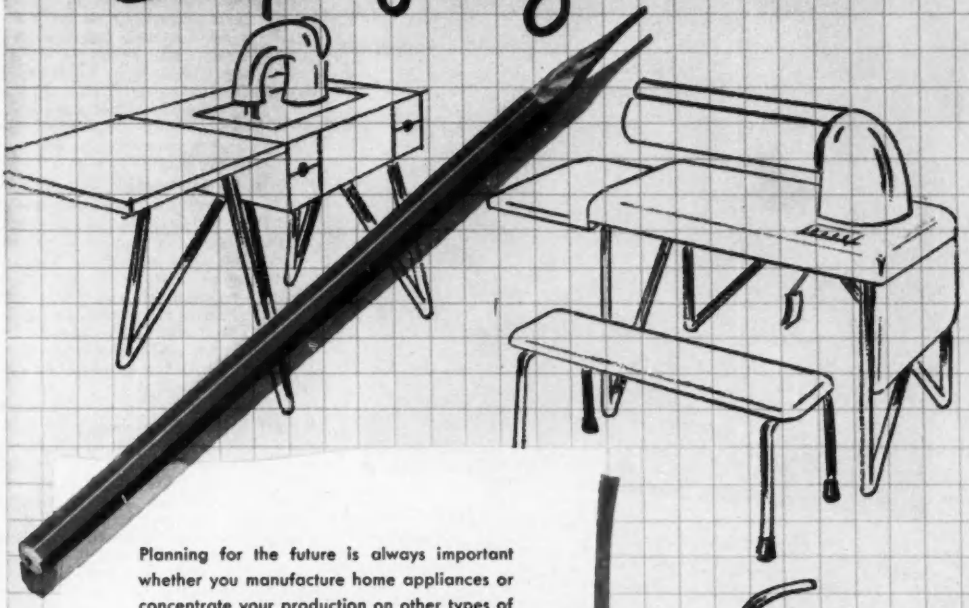
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THE OHIO SEAMLESS TUBE COMPANY

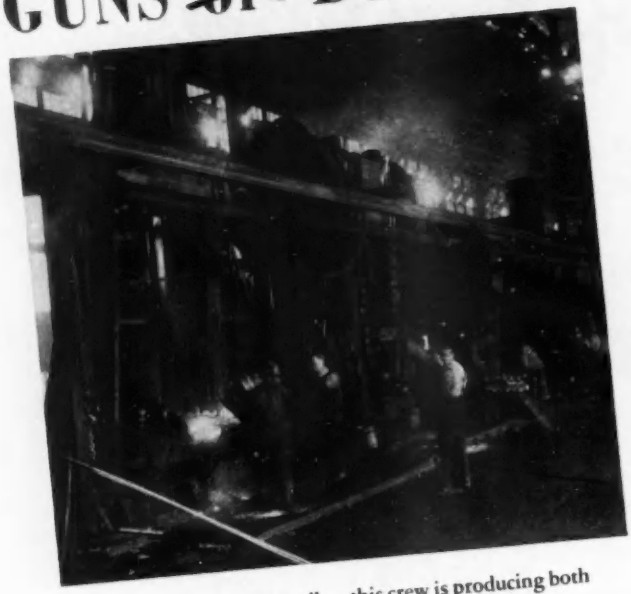
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"Guns or Butter"... this crew is producing both ... essential equipment for our fighting men and parts for civilian consumption.

If this is an all-out struggle for survival ... and we believe it is ... defense needs must come first. Devoting approximately one-fifth of the nation's productivity to armament work will cause some disruption in our civilian economy. It need be only temporary. The answer is production ... production ... and still more production.

The demand for "guns *and* butter" is a direct challenge to American industry and to each of us who form a part of it. Kropp Forge Company, *America's Number One Forge Plant*, will attempt to meet that challenge ... devoting our complete drop, hammer and upset facilities to the job of hammering out more and more quality forgings for defense and essential civilian production.

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Sprocket forging, 27" diameter, 1¾" thick, weight 82 lbs.

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46 passengers. This also was powered by the Alfa-Romeo tranversely mounted Diesel, with eight-speed transmission.

A Krauss-Maffei coach, built in Munich, had longitudinal rear engine mounting, with the drive carried forward to a six-speed ZF transmission, then back to the rear axle. This vehicle was shown as a long-distance coach.

O.M., now exclusively on truck and coach production, with Diesel engines produced under Saurer license, showed two coach models with rear engine mounting and integral frame-body construction. These embodied the Saurer pre-selective transmission with electro-pneumatic control, giving eight forward and two reverse ratios.

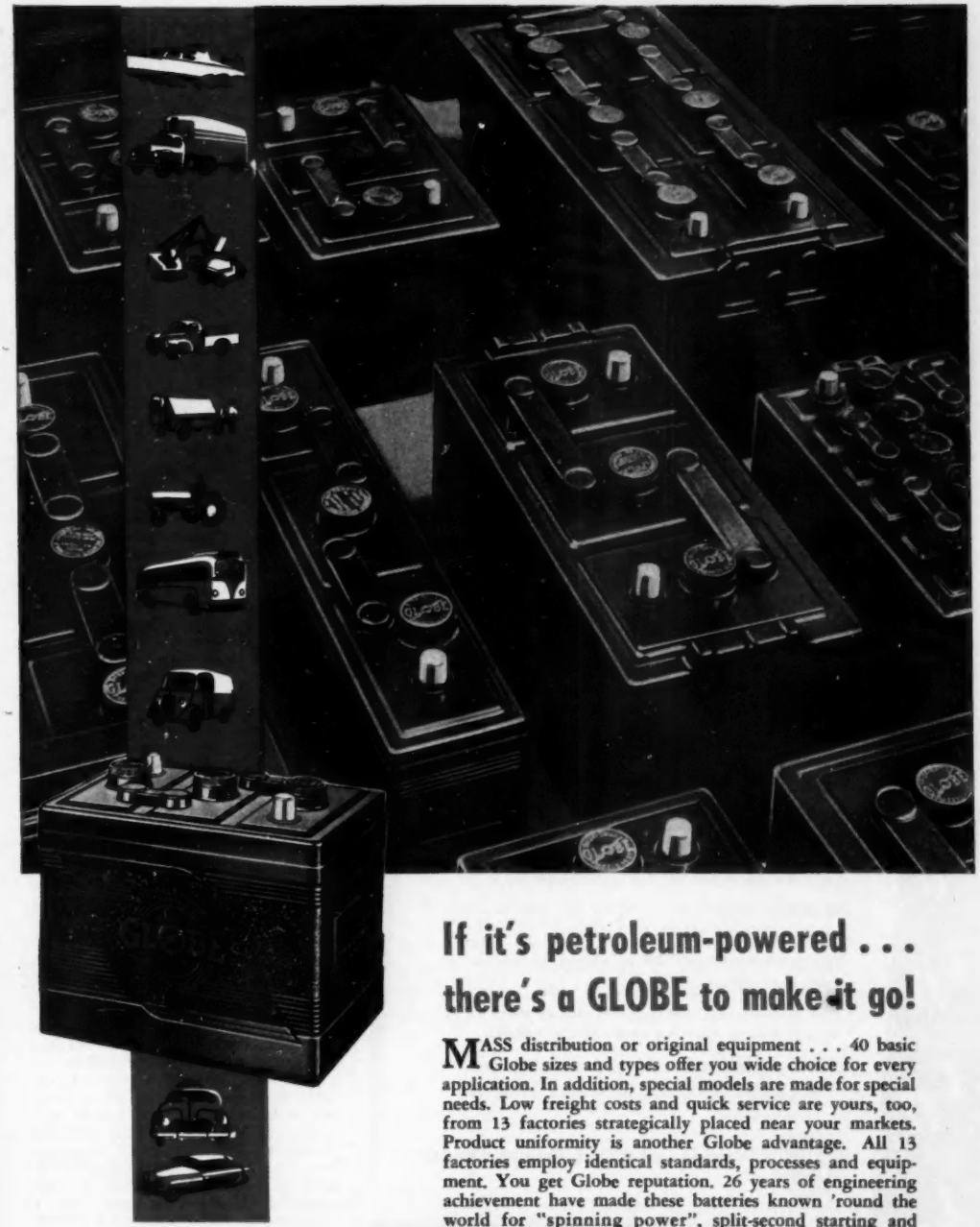
Another development imposed by local conditions is the three-axle trailer with front and rear steerers, as shown by Zara, of Padua, and by Bartoletti. With three axles, overall lengths are carried up to 32 ft. It is also with a view to handling on mountain roads that Alfa-Romeo has produced a three-axle truck, useful load capacity 10 tons, with front and rear steerers. This is equipped with the standard six cylinder Diesel of 579 cu in.

Generally, Italian truck and coach design is governed by local geographical and economic conditions, features of which are mountainous country and high fuel prices. These explain the exclusive use of Diesels for engines above 183 cu in., the high number of gear ratios (from four to eight), the extensive use of trailers for both freight and passengers, and the big development of sight-seeing coaches in a country where railroads do not penetrate easily.

BOOKS ...

ILLUSTRATED BOOK OF THE AUTOMOBILE IN FIVE LANGUAGES, published by *Bibliothèque de L'Argus de l'Automobile, Editions S.N.E.E.P., 1 Place Boieldieu, Paris, France.* Price 1300 francs postpaid. Written in five languages—French, English, German, Italian, and Spanish—this book contains descriptions of the various parts of automobiles, motorcycles, and bicycles. Illustrations are given on one page while the descriptions are given on the opposite page. It is a very useful book for those engaged in the automobile industry who at times require the foreign terminology of mechanical components.

MARKS' MECHANICAL ENGINEERS' HANDBOOK, *Revised 5th Edition*, edited by *Lionel S. Marks*, published by *McGraw-Hill Book Co., 330 West 42nd Street, New York 18, N. Y.* Price $15.00. From aeronautics to metal cutting machines, the 2200 pages in this completely revised edition contain data in every branch of mechanical engineering. Covering theory, standards, and practice, it was compiled by over 100 specialists in various fields. Its numerous descriptions, fundamentals, formulas, methods, tables, diagrams, etc., give the answers to a wide variety of mechanical engineering problems. The index of more than 12,000 entries is one of the fullest and most useful to be found in technical books.



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Measuring and Recording Muffler Efficiency

(*Continued from page* 52)

noise, as recorded during the road test, to be dissected in the laboratory; to be measured accurately and recorded in black-and-white.

At Donaldson, the magnetic tape is first used in designing and testing experimental mufflers for specific vehicles. The engineers have built up a reference library of over 600 tape recordings of the varying sounds created by different designs and adjustments.

Next, a sales engineer, equipped with a portable tape recorder and a set of experimental mufflers for the type of vehicle involved, calls on the potential customer. With the customer's engineers, he tests each muffler on the test vehicle—and records each test on the tape recorder. For stationery tests, a flat response microphone is placed 30 in. to the side and 30 in. to the rear of the tail pipe; for road tests the microphone is located as nearly in that position as possible, and kept in the same position for all tests of mufflers on that vehicle. Recordings are made of each different muffler, at a series of standard speeds and loads.

Back in the customer's laboratory, short sections of each recording are spliced together to form one continuous reel of tape, each section containing the recording of a different muffler at a comparable load and speed.

The tape-recorded results of these tests, which may have taken any amount of time from one or two days to a full week or more, are then brought to the executives of the customer company. The executives hear their own engineers report on the tests, and then hear the tests themselves.

Since the change from the recorded noise of one muffler to another can be instantaneous on the spliced tape, it gives the customer a direct comparison of the experimental mufflers—a direct comparison that would otherwise be virtually impossible—and it makes selection comparatively easy.

When the choice is made, the chosen muffler and the applicable section of the tape recording are sent back to the Donaldson research engineers for use in developing the final product.

The engineers use the recording in a variety of tests, usually starting with the noise abatement test. By playing the tape at 10 to 15 decibels lower than the original recording level, the engineers can detect chirping and similar noises that are not normally noticeable but are important in designing.

In another test, sections of the recording representing constant engine speed and load are played into a sound analyzer, making it possible to graph the sound level against specific frequencies. Such a graph helps the design engineer to iron out undesirable peaks. Not all peaks are undesirable, for occasionally they combine to form a blend of sound more pleasant to the ear than a noise of less intensity without the blend.

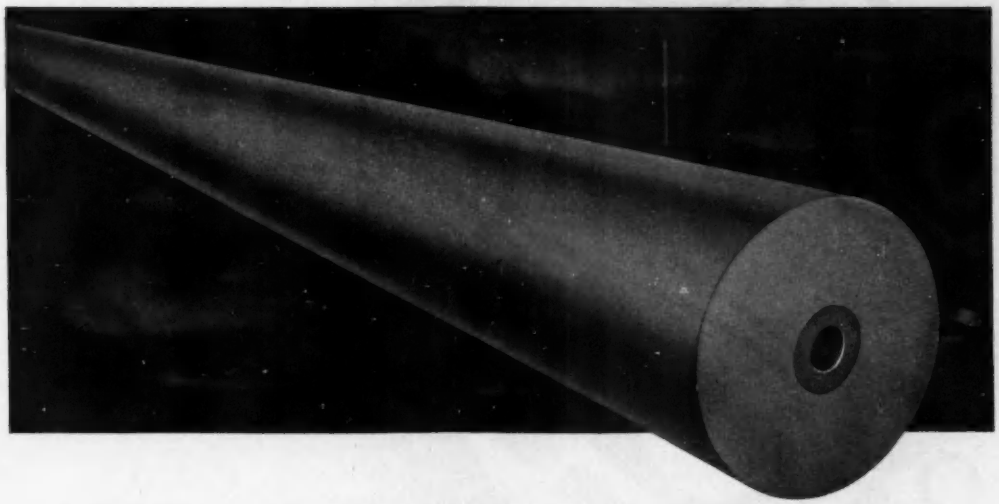
Each change in design is recorded in road tests, then analyzed in the laboratory. Final objective is a much improved muffler designed specificially for the customer — plus a tape recording that can clearly demonstrate the improvement in the customer's office.

Equipment involved consists of portable Magnecord tape recorders, playing at 15 in. of tape per second, and Minnesota Mining and Manufacturing Company's "Scotch" sound recording tape No. 111, the same tape that is used by the sound engineers of radio networks and recording companies.

Not all of the tests become a permanent part of the engineers' tape library —but none of the tape is thrown away. The tapes that are not needed for the library are put back into stock, since they can be re-recorded repeatedly without loss of quality. Old recordings on the tape are automatically erased as new recordings are made.



a product of imagination . . .



. . . with an ideal combination of electrical and mechanical properties

By working alongside folks like yourself—at design desks, workbenches, and in laboratories—we've acquired a good idea of the time, care, and imagination you pour into the engineering and production of your products. The thick-skinned insulation tube for an expulsion fuse shown here is a good example. The manufacturer wanted moisture resistance, high strength, weather resistance *plus* excellent arc resistance—all wrapped up in a material that was easy to machine. Working with him, and using a little imagination, C-D engineers came up with *two* different plastics: Laminated Dilecto Tubing for the wall, and Vulcanized Fibre for the core.

It's another example of how you, too, can depend upon C-D to engineer the right laminated plastic for your needs. For C-D has no "axe to grind." We can recommend from five basic plastics subdivided into a remarkably wide range of grades and combinations of grades to supply almost *any combination* of mechanical, electrical, and chemical characteristics. For *this* kind of help and imagination, call your nearest C-D office, any time.



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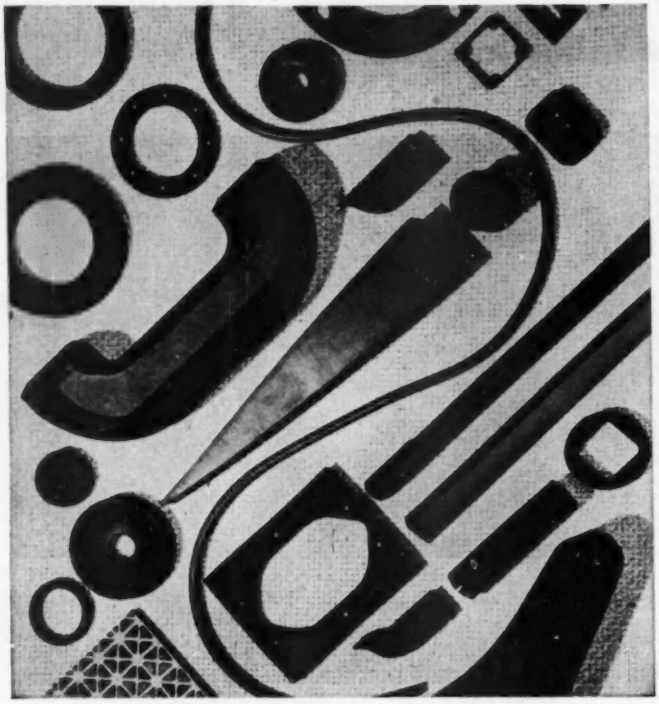
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DIAMOND FIBRE (Vulcanized Fibre)
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Photo-micrograph of RUBATEX closed cellular rubber shows the tiny individually sealed balloon-like chambers which retain inert nitrogen under pressure.

RUBATEX
CLOSED CELL RUBBER

ZERO MOISTURE ABSORPTION
RESILIENT AT LOW TEMPERATURES
EXCELLENT SHOCK ABSORPTION

Chrysler Production

(*Continued from page* 49)

Among the variety of equipment is a large battery of familiar oil hole drilling machines, arranged in individual units consisting usually of two angular heads and a horizontal head, as illustrated.

One of the large specialized multi-purpose machines in this line is the horizontal double-end, trunnion type machine for drilling, tapping, and reaming holes at both ends; and drilling the lightening holes in the two end pins of the crankshaft. The sequence of operations is as follows:

Station 1—Load and unload.
Station 2 (RH)—Drill pilot hole in No. 4 pin.
Station 3 (RH)—Counterbore flange. (LH)—Drill pilot hole in No. 1 pin.
Station 4 (RH)—Complete lightening hole in No. 4 pin. (LH)—Complete lightening hole in No. 1 pin.
Station 5 (RH)—Drill eight flange holes. (LH)—Counterbore and countersink gear fit end.
Station 6 (RH)—Countersink flange end holes. (LH)—Tap hole.
Station 7 (RH)—Ream seven holes.

Unique in passenger car practice is the shot peening of the entire shaft, after turning and before the start of grinding, in a horizontal type machine fitted with a power driven conveyor. Primary object of the operation is to impart resistance to fatigue to the undercut fillets on pins and journals. After grinding, the shot peened finish remains only on the fillets, cheeks, and counterweights. Engineering specifies for this operation the use of 0.028 in. diameter clipped wire made of SAE 1065 and having a hardness ranging from Rc 45-50.

Crankshafts are dynamically balanced in the compact, electronically controlled combination balancing and drilling machine, illustrated here. In operation, cranks are placed in the cradle which automatically lowers the work onto the balancing rolls. While the shaft is being balanced, the spindle stops are automatically set by the electronic unit to remove the proper amount of material and in the right location to achieve balance. For drilling, the work is elevated off the balancing rolls.

Final operation is the Superfinishing of all pins and journals in the familiar machine, although considerably more compact for a V-8 shaft. It is of interest that surface finish is specified as 15-micro-inches (rms).

Connecting rods and caps, individually forged, are machined in a self-contained department, rough forgings being weighed and sorted in seven-gram groups. Sides of rods and caps are broached in a 5-42 vertical hydraulic single ram broaching machine, taking a cap and a rod at a time. The joint face and half-bearing then are broached

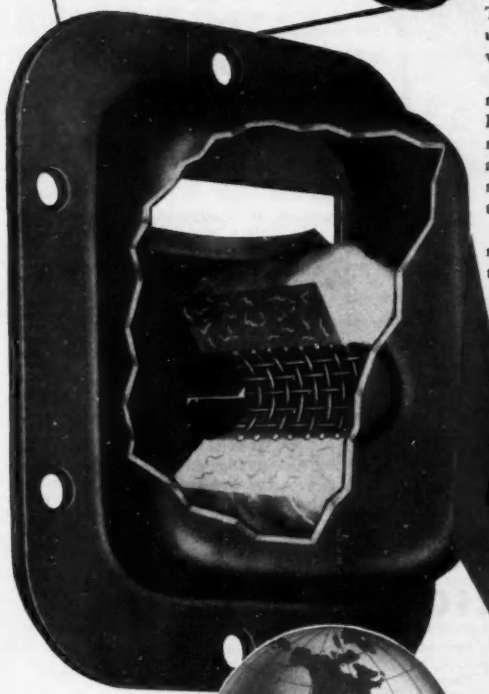
(*Turn to page* 130, *please*)



Consolidated Freightways, Portland, Oregon, *road-tested* Transmission Gear Oil Filters before installing them on all unit and auxiliary transmissions in their fleet. And here is what the road-test, combined with laboratory tests, *proved:*

On one test, transmission gear oil in a Fuller 4B86 Transmission was sampled after 23,198 miles of service when the Fuller Transmission Gear Oil Filter was installed . . . 33,603 miles later, the same oil was again sampled and "laboratory analysis proved that the oil that had accumulated the higher mileage, was much less contaminated with foreign material than when the filter was installed."

That's why Mr. Ogden is enthusiastic about filters for transmission gear oil. He has proof that it is a way to prolong the life of bushings and bearings.



Protect your gears and bearings for only $6.95*

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Fuller TRANSMISSION GEAR OIL FILTER

In the Fuller Transmission Gear Oil Filter, normal pressure of rotating gears forces the oil through a cleansing filter and returns it to the gear box. Filter element is replaceable. Unit quickly installed on Fuller Transmissions and most other makes over power take-off opening. And, you pay only $6.95* List* for a Fuller Transmission Gear Oil Filter to protect you against unnecessary down-time and resultant expense.

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

in pairs in a heavy duty, double-ram surface broaching machine, having two double fixtures, handling two pairs of rods and caps. The sides and tops of both bosses then are broached in pairs in a 10/66 vertical hydraulic surface broaching machine fitted with two stations, handling two pairs at a time.

The joint face of rods and caps is ground to size in a multiple-head rotary surface grinding machine.

The special one-way, 36-in., four-station automatic horizontal indexing machine is used for drilling, and rough- and finish-reaming of bolt holes in rods and caps. Each station holds three rods and three caps.

Skipping some of the intermediate operations, we reach the assembly of rods and caps, followed by grinding both sides of the crank end and one side of the pin end in a multiple-head automatic surface grinder. This leads to another of the unusual operations—profile milling of the piston pin end of the rod. This is done in a special four-head milling machine, profiling two rods at a time at each station, the rods being stacked in the fixture.

Another "first" recorded here is the special electronically operated milling machine designed for weight balancing of connecting rod assemblies. As illustrated, it is a two-station machine—the balancing station which initiates the electronic control of the milling station, and the milling station. What happens is this: The operator places the rod assembly on the weight station and the electronic unit automatically proceeds to calculate the amount of metal to be removed at each end. This information is transmitted to the milling station which is ready to remove just the right amount of metal as soon as the operator places the assembly in the fixture and pushes the start button.

While the rod is being machined—hollow-milled at the piston pin end and end-milled at the flat on the bottom of the cap—the operator places the next rod assembly on the scales where the electronic unit stores the information ready for use when the start button again is pressed. Control is so sensitive that the machine is capable of producing rods of equal weight within limits of plus or minus one gram.

In addition to the individual operations on the bores at both ends of the rod, including precision-boring of both ends, the crank bore is honed to final size in a familiar double-spindle, vertical type machine, fitted with a rotary indexing table. The table has four stations with two rods stacked in each fixture, two pairs being honed at a time. Final bore size is held to a total tolerance of 0.0005 in.

One of the latest developments on the connecting rod line is the installation of an electronic gaging machine performing a multiplicity of operations as follows:

1—Gaging of crank bore diameter—2.3750-2.3755 in. Roundness is checked by 180 deg rotation of the work on the plug.
2—Squareness of crank hole with one face within 0.001 in. total indicator reading. Out-of-square readings are taken by rotating the rod 180 deg after it is clamped in position.
3—Parallelism of crank hole faces within 0.001 in. total indicator reading.
4—Crank end width—0.944-0.996 in.
5—Piston pin diameter—0.9843-0.9846 in., grading in three classes of 0.001 in., and etching pin hole surface for grade.

The last item indicates that in addition to the five major criteria handled automatically in this machine, it also grades pin bore in three classifications and automatically etches the surface to indicate the grade. For this purpose the machine has three etching levers actuated by solenoids, the end stroke being dash-pot cushioned and speed-controlled. If the pin bore is undersize a pressure switch comes into action to prevent marking.



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VULCAN diaphragm fabrics excel in such applications as fuel pumps, vacuum booster pumps, dashpot mechanisms and others.

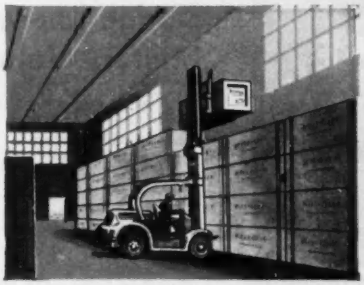
VULCAN fabrics have high resistance to aromatic gasoline, oil, alcohols, butane, propane and solvents. They also provide high tensile and burst strength.

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Vickers Steering Booster on lift trucks, loaders, off-the-road trucks or any wheeled cargo mover supplies all the front wheel turning effort and absorbs all the steering shock. The heaviest vehicle steers as easily and precisely as a passenger car . . . provides for the extremely short turns and precision control in restricted areas which saves real time.

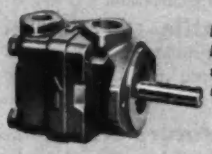
Safety is improved with all steering shock transmitted to frame . . . the wheel cannot be snapped out of the driver's hands under any conditions. Drivers are less fatigued, more alert, able to operate efficiently for longer periods of time.

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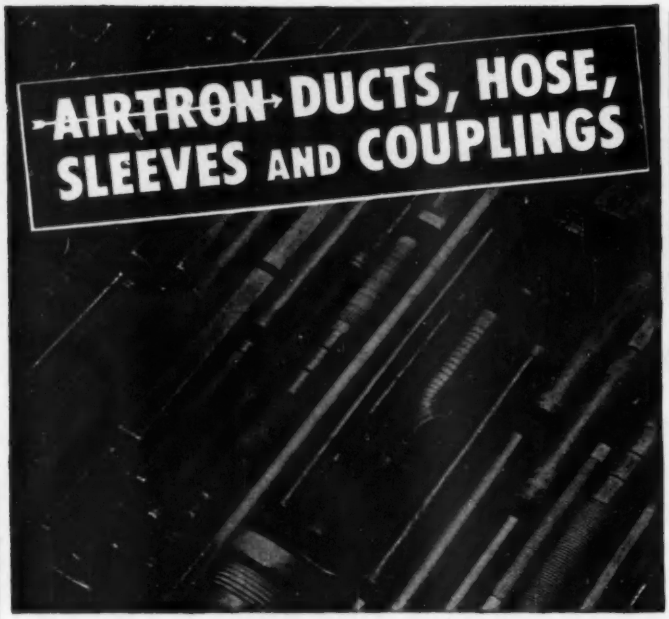
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"O" RINGS ★ SILICONES ★ PRECISION MECHANICALS ★ ~~AIRTRON~~ DUCTS

Dodge Improved Military Vehicles

(*Continued from page* 56)

fatigue. Driver comfort is further enhanced by cab design which provides roominess, seating comfort, and protection from the elements.

Ease of maintenance has been given attention to permit easier and faster repair through a unit replacement system which reduces to the minimum the out-of-service time for a vehicle. Too, these vehicles represent the maximum of interchangeability with the service parts now in the supply system of the Armed Forces for similar vehicles of World War II. Actually the serviceable parts have about 75 per cent interchangeability. In addition, the mechanical components of these vehicles are obtainable from existing civilian production tools to a high degree.

All of the vehicles described here are equipped with the 24-volt electrical system specified by the Armed Forces in the interest of interchangeability. Required primarily for communication equipment, the system is fully waterproofed and thus protected against failure in fording and amphibious landings. Not only are individual elements fully waterproofed but they are fully suppressed against radio interference, the distributor being suppressed internally.

Mechanical specifications for the four basic military vehicles are given in the appended table. It will be noted that the M-37 cargo and M-42 utility are mounted on the same chassis and use the same basic body structure. The M-42 is designed primarily as a command car and is fitted with seats, tarpaulin cover, and other special equipment such as field radio.

Similarly the M-43 field ambulance and the V-41 telephone installation vehicle are both mounted on a 126-in. chassis. The ambulance is said to represent a marked advance over the similar vehicle of World War II vintage, the body being more compact and simplified. It possesses the qualities and advantages of the M-37, and features versatility for use with litter cases or seated casualties. It has positive control of heating and ventilation in any ambient temperature. Moreover, it affords ready access for tending patients in transit.

From a design standpoint it is of interest that the longer wheelbase, as compared with the 98-in. wheelbase in World War II, coupled with better weight distribution, has improved cross-country ride considerably. Additional improvement can be credited to the adoption of large diameter heavy duty direct acting shock absorbers.

These vehicles comply fully with Army requirements for gradability. For example, the M-37 and M-42 without towed load will move at 30 mph

(*Turn to page* 134, *please*)

Call on Morse

for better timing drive performance

It almost goes without saying that Morse makes the finest timing drives available today. For Morse Timing Drives give you greater design and manufacturing freedom, save assembly time. And, of course, Morse Timing Drives perform better, longer, more quietly; give efficient, trouble-free service.

What's more, Morse stands ready to help you get the performance *inherent* in Morse Timing Drives. We offer our engineering and design assistance, based on forty years of timing drive leadership and close cooperation with automotive engineers.

Have our engineers review your present timing drive situation or make recommendations for timing drives on your engines now in the planning stage. Write us today for more information.

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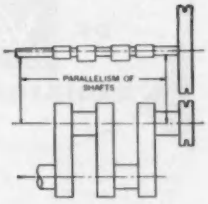
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POWER TRANSMISSION
PRODUCTS

PRODUCTS OF BW BORG-WARNER

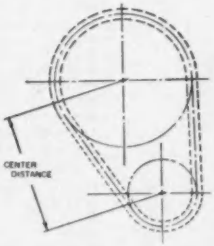
Four major advantages of Morse Timing Drives



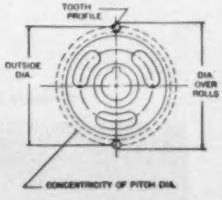
Morse Timing Drives maintain accurate and positive timing despite end-play of shafts.



Morse Timing Drives assure safe, quiet performance though camshafts and crankshafts are not exactly parallel.



Morse Timing Drives permit greater engine block tolerances and economical production because of increased center distance tolerance on drive.



Morse Timing Drives permit greater manufacturing tolerances on sprockets, therefore allow the production of a complete drive under the most favorable and economical conditions.

with transmission in direct and transfer case in high range on a grade of 6.2 per cent. In lowest forward gear and transfer case in low range, the vehicles (without towed load) are capable of negotiating a grade of 68 per cent. They are capable of a road speed of 55 mph on paved roads, in direct gear, with the engine governed to 3200 rpm. Minimum speed with engine at full torque and in lowest gear ratio combination is two mph.

The clutch is of single-disk type fitted with molded woven asbestos lining having an area of 100.53 sq. in. Service brakes are of internal expanding hydraulic type with 14⅛ by 1¾ in. lining, ¼-in. thick. Tires are of all-service type, 9.00-16, 8-ply.

Front and rear springs are of semi-elliptic type, two-in. wide, 46-in. long in front, 56-in. in rear.

The Business Pulse

(*Continued from page* 54)

tions. The amount of rubber available for passenger-car tires has been held at 90 per cent of the 1950 consumption level. New passenger cars must now be sold without spare tires. It is widely doubted, however, that this measure will save much rubber as long as car owners are free to buy tires separately.

The wisdom of further governmental stockpiling of rubber at present has been questioned by some authorities in view of the large amount already in the Government's possession and the possibility of a critical shortage in civilian supply. The official view is that stockpiling must continue until the official objective is reached, but it is conceded that the attainment of the goal may not be far distant.

Restrictions on the use of numerous metals have been tightened. The consumption of lead has been limited to the comparatively low level that prevailed in the first half of 1950. Steel mills have been ordered to reserve for defense purposes proportions of their total June output of carbon steel products ranging from 10 to 63 per cent, as against 5 to 60 per cent at present. Copper producers have been notified that they will be required to put aside 5 per cent of their output in May and June for defense purposes and for civilian hardship cases. Aluminum for civilian use has been reduced from 65 to 50 per cent of the amount used during the first half of 1950.

These restrictions, combined with price controls, have forced some industrial cutbacks and layoffs, mostly in the field of consumer durable goods. Among the industries affected are automobile, tire, radio, television, and farm-implement manufacture. Some small woolen mills have closed, reporting that they were unable to operate profitably under current price controls.

From the civilian consumer's point of view, it would appear that worse is yet to come. The year immediately ahead is likely to witness the most severe impact of the rearmament program on the civilian economy, according to Charles E. Wilson, Defense Mobilizer. Declaring that this impact has hardly been felt as yet, Mr. Wilson predicts that in the coming year, shortages are sure to occur in some civilian goods, especially products made from metal. In the following year (1952), if the program is successful in preventing war, "shortages may begin to ease and we can probably begin to talk about taking off controls." By 1953, the country will have reached a scale of rearmament and of output that will make it possible "to maintain a high level of military expenditures on top of a healthy civilian economy—which, at that time, will be free to resume its upward trend." Civilian output in 1953, Mr. Wilson believes, will be larger than it was before the Korean outbreak.

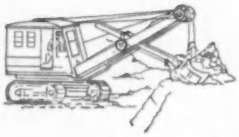
Taxing and Spending

The sentiment of Congressional committees currently assessing the taxing

(*Turn to page* 136, *please*)



Typical sheet metal radiator for small shovels and cranes. Cast-iron tank radiators furnished for larger machines. All YA units for this service are specially built of heavier gauge materials.



Check the radiators used to cool busy engines of America's leading cranes and shovels. You'll find many are Yates-American.

Yes, for the really tough jobs — those that demand the utmost in uninterrupted cooling performance — wise engine manufacturers rely on Yates-American radiators. They know from experience that YA engineers are sure to come up with the right answer for any heat transfer problems. They also know that Yates-American radiators they get tomorrow will be of the same high quality as those received last year.

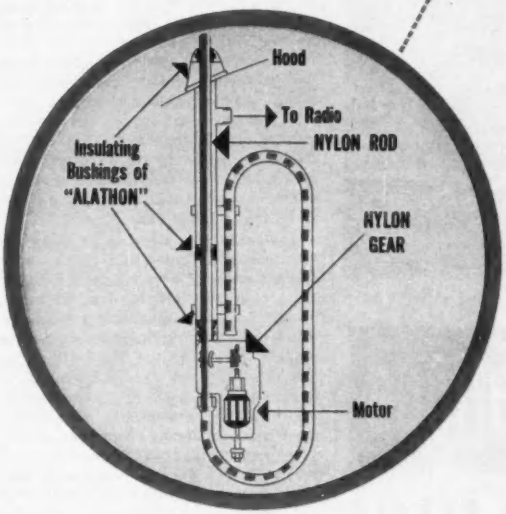
No matter what your heat transfer needs may be, you can be sure of prompt, accurate help from Yates-American — producer of quality radiators for motor and industrial trucks, tractors, compressors, locomotives, and power plants. Write today for complete information.

California Representative: E. E. Richter & Son, Emeryville, Cal.

YATES-AMERICAN MACHINE CO.
HEAT TRANSFER PRODUCTS DIVISION BELOIT, WISCONSIN



Du Pont NYLON plastic drives new automatic antenna



When driver pushes button, motor-driven worm gear turns nylon gears, which turn spring-loaded pulleys. Nylon rod is driven up by pulleys, forcing "live" members upward. Rod coils into trombone-like shape (dotted line) when antenna is lowered. Insulating bushings are made of Du Pont "Alathon"* polythene resin, an outstanding high-frequency insulating material. *TRADE-MARK

DU PONT
PLASTICS
Better Things for Better Living
. . . through Chemistry

Only nylon meets mechanical and electrical requirements for Packard antenna

When the Casco Products Corp., Bridgeport, Conn., designed this new motor-driven antenna for Packard automobiles, plans called for a 4½-foot flexible rod to raise and lower "live" members. This strip had to have an unusual combination of properties. Most important of these: it had to be rigid enough to force the antenna up and down, yet flexible enough to fold into a trombone-like position when the antenna is down; and the rod had to have good dielectric properties.

Only Du Pont nylon plastic was found to have all of the properties required. The nylon driving rod has excellent mechanical strength and very low deformation under load, yet is flexible even at extremely low temperatures. The curvature in the trombone-like position has a 4-inch radius, and the nylon rod, while rigid enough to raise and lower the antenna, still takes sharp curves easily. And nylon's electrical properties meet the requirements of the application.

In addition, two nylon gears engage a steel worm gear which is an extension of the armature shaft. They're molded directly onto the shafts to which driving pulleys are attached. The nylon gears are quiet and long-lasting. Both rod and gears have been subjected to as many as 80,000 cycles—many times more than they could possibly be called on to withstand during the life of any car. Neither shows any sign of wear.

This is one of many uses for nylon plastic in the automotive industry—gears, bearings, valve seats, and such electrical parts as fuse holders, insulator bushings, and switch components. Demand for nylon currently exceeds supply. However, we suggest that you investigate its versatile properties for future application. We will gladly discuss the availability of quantities for development work. For further information on nylon and other Du Pont plastics, write:

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General Motors Building, Detroit 2, Michigan
350 Fifth Avenue, New York 1, New York
7 South Dearborn Street, Chicago 3, Illinois
845 East 60th Street, Los Angeles 1, California

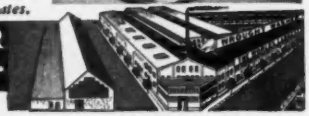
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Large volume production, the most advanced methods and facilities, plus more than 60 years of continuous experience in the manufacture of Washers, are factors that enable us to offer you top quality washers and stampings at competitive costs. Over 22,000 sets of dies for making Washers of every type (Standard and Special), from every type of material, for every purpose, in any finish. STAMPINGS of all descriptions; Blanking, Forming, Drawing. *Submit your blueprints and quantity requirements for estimates.*





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START with PERMA Seats and Cushions

. . . specially designed or standard—you'll start *right* with a quality-built seat from Perma Products. You'll reduce driver fatigue, too, because Perma seats are *engineered,* cost less per year of service*—and the cost is right, too. On *your* next seating job, why not consult Perma Products—as leading manufacturers do. Send us your prints for prompt service and estimate.

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*Commercial Car Journal says average seat cushion life is 45,931 miles.

Custom Built for
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FARM, ROAD BUILDING AND MATERIALS HANDLING EQUIPMENT

PERMA EXCELLENCE OF QUALITY PRODUCTS
PERMA AUTOMOTIVE DIVISION

and spending situation for the coming fiscal year has become more clearly defined in recent months. It seemed apparent in February that Congress, for various reasons, could not heed President Truman's request for a hastily enacted tax bill to be followed later by a second "instalment." Congressional sources subsequently made it clear that they would examine the entire tax structure before agreeing on revenue legislation. The scope of the examination and the many witnesses heard in closed hearings last month indicated to many observers that the House Ways and Means Committee would not meet its self-imposed May 1 deadline for submitting a tax measure to the House. Others doubt that a tax bill will be passed until fall.

One apparent attitude of the committee has been reflected in other than Government circles. The warning voiced by the Joint Committee on the Economic Report that the Congress must be "prudent, frugal, even parsimonious" supplemented a chorus of similar recommendations by private organizations throughout the nation. Proposals made by such groups last month called for reductions in Federal nondefense expenditures varying from $5 billion to $10 billion.

A considerable segment of Congress has insisted for some time that the official estimates of revenue from existing taxes next year are too low. This has provided a partial basis for a corollary belief that the original Administration request for a total of $16.5 billion in new taxes was too high. Last month a Congressional staff of tax experts, whose findings are usually accepted by the Ways and Means Committee as the most nearly accurate ones available, predicted that Federal revenues in the 1952 fiscal year, which begins July 1, will exceed revised Treasury estimates by $2.4 billion. If the committee approves these figures, prospective requirements for new revenue may be scaled down by a comparable sum. The final tax figure presently mentioned most frequently by political reporters hovers about $7 billion—$3 billion less than the Administration's most recent request.

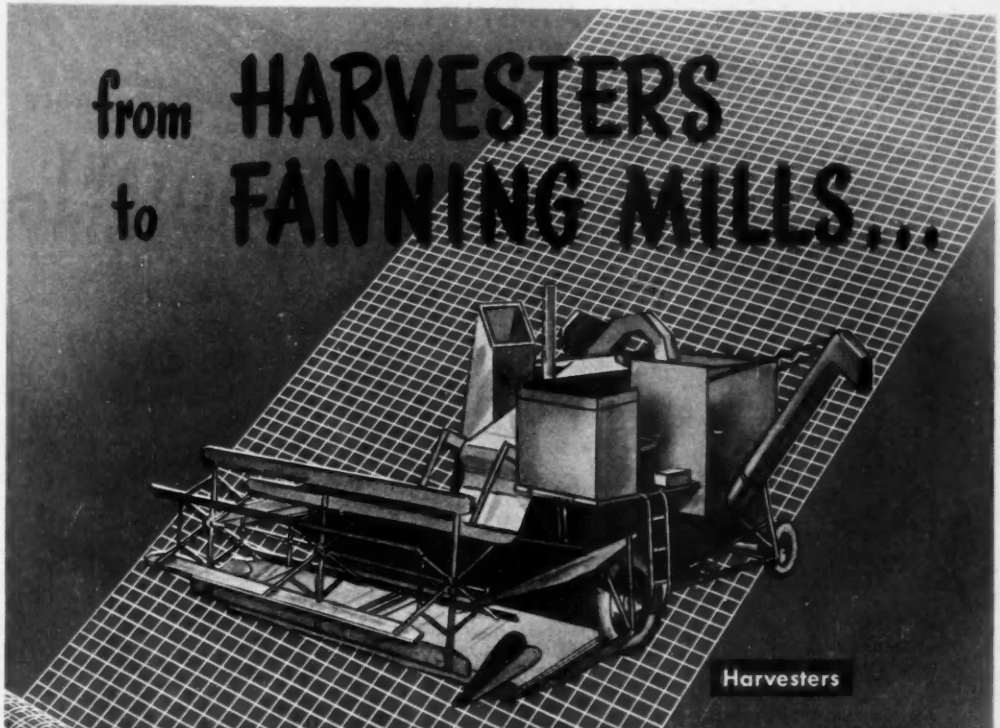
West Germany Holds Largest Show

(*Continued from page* 41)

Opel car was exhibited in the new Captain model.

Among the 36 foreign exhibitors, five came from the United States, 13 from Britain, and eight from France. Three from Czechoslovakia represented the only Iron Curtain country in the exhibition.

from HARVESTERS to FANNING MILLS...



wire cloth FOR FARM EQUIPMENT

- Harvesters
- Tractors
- Combines
- Corn Pickers
- Cotton Pickers
- Lime Spreaders
- Orchard Sprayers
- Fanning Mills

Even though the types of farm equipment are so different from each other... even though the uses of industrial wire cloth in that farm equipment are so many, and so wide, and so varied ... Reynolds wire cloth has proven its dependability over and over again. And yet farm equipment is only one of several industries that Reynolds wire cloth is serving so satisfactorily. Reynolds has more than fifty years' experience. A consultation on your wire problems costs you nothing.

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Ignition Switches
Turn Signal Switches
Rolled Shapes

Widely used by leading builders of cars, trucks, buses and tractors, Mitchell ignition switches, turn signal switches and rolled shapes meet the most exacting specifications of the automotive industry.



AUTOMOTIVE IGNITION SWITCHES

Original equipment on many popular make vehicles, Mitchell ignition switches are noted for extra long life. "Radio" position at no extra cost.

TURN SIGNAL SWITCHES

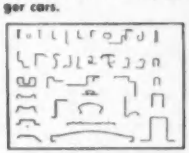
Semi- automatic, self-cancelling. Afford drivers easy, positive way to indicate turns to approaching and following traffic as well as to pedestrians.



Mitchell clamp-on and screw-type semi-automatic turn signal switch for trucks, cars, buses, tractors.

Mitchell 6-wire concentric-type semi-automatic turn signal switch used in passenger cars.





ROLLED SHAPES

Complete range of metals, designs and gauges in stainless steel, aluminum, brass, bronze, copper—cold rolled, drawn and pressed—for automobiles, airplanes, railroad cars, architectural requirements, radios, television receivers, all industrial uses.

Our sales engineers work with you in the application of Mitchell products to your specific designs. Call on us at any time.

UNITED SPECIALTIES COMPANY
Mitchell Division, Philadelphia 36
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UNITED AIR CLEANER DIVISION
CHICAGO 28
Air Cleaners • Metal Stampings

Airbriefs

(*Continued from page 60*)

drive is needed to provide compressed air for an eight-ft supersonic wind tunnel at NACA Ames laboratory to test supersonic aircraft models. The huge presses are needed for the press-forging of integrally-stiffened skin sheets for supersonic aircraft wings, which are going to have to sustain loads far beyond any previous requirements.

Mohammed to the Mountain

Wright Aeronautical Corp. is finding its new Detroit branch office one of the most effective new ideas in its production plans for the imported J65 Sapphire engine. Wright established the office, staffed with about 20 men, to handle subcontracting on the engine, the idea being that a staff right in Detroit could expedite the job of letting subcontracts in the area a lot better than remote-control at Wood-Ridge, N. J., the main factory. It will be recalled that Buick Division, GMC, has received a contract for production of the Sapphire jet engine. However, the Wright Detroit office is entirely separate from this activity, and is designed to locate and sign up subcontractors for about 1700 different parts in the Sapphire engine. Additionally, the office functions as a purchasing group for machine tools needed back at Wood-Ridge. These tools are being obtained from the Air Force storage pool in the area firstly, but on a direct-purchase basis for those not available from the pool.

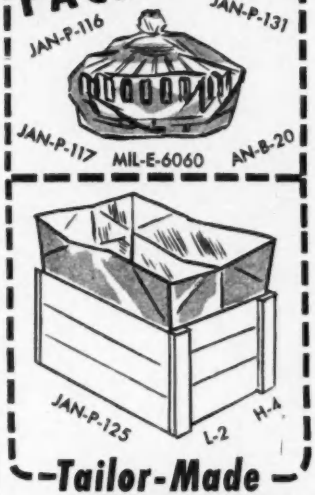
Quarter-Century Young

The U. S. airline industry celebrated its 25th anniversary last month—in about the same high state of glamour and debate as it begun. The first airline, of course, is a highly-debatable historic problem but for the official record the industry has decided that the beginning of scheduled operations by Western Air Express (now Western Air Lines) and Varney Air Lines (now United Air Lines) both in April, 1926, marks the start of the industry.

Quite a strong case can be made both for and against the progress of that quarter-century, in safety, cost or convenience. It is significant, however, that Western Air Express began its service with the Douglas M-2 single-engine biplane and will shortly receive the first Douglas DC-6B super-sleek four-engined transport plane. Between these two airplanes lies a gulf of 80 passengers, 200 mph in speed, and some 3000 miles in range. There is also another gulf between them; a difference of nearly one million dollars in cost! It has been a painfully-slow evolution, with most of the progress being shown in the past five years. We are now told, however, that we will have 380-

(*Turn to page 140, please*)

Kennedy
YOUR DEPENDABLE SOURCE OF
MILITARY PACKAGING



—Tailor-Made— to ARMY-NAVY SPECIFICATIONS

Kennedy's long-experienced packaging engineers are always ready to develop, and Kennedy's extensive plant is always fully equipped to produce unlimited varieties of paper, plastic, and foil bags for practically any product or material . . . tailor-made to Army-Navy specifications.

This packaging is precisely engineered to provide the *full protection* so vital for military materials in transit and storage . . . *full protection* against air, moisture, water, dust, dirt, under extremes of heat and cold as requirements demand . . . *full protection* for all types of products from huge aircraft engines to tiny precision instruments; even food and medical supplies . . . assuring delivery of your product in the same condition as when it leaves the factory, regardless of time or weather.

Yes, Kennedy is your dependable source of military packaging . . . *including bags of V.P.I. materials* . . . no matter what the requirements may be.

KENNEDY CAR LINER & BAG CO., Inc.
SHELBYVILLE, INDIANA
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ear's where trouble starts!



Fully engineered

MUFFLERS

For 150-300 H.P. Engines



MODEL M90016 vertical cab-mount muffler

Dimensions: Diameter 9", body length 45", I.D. sleeves 4 1/16".

Model M01201 oval-type for under-chassis installations

Dimensions: 10" x 15" oval, body length 25", I.D. sleeves 4 1/16".



Fully-guaranteed by the Donaldson Co., Inc., world's largest manufacturer of heavy-duty air cleaners

...but Donaldson Heavy-Duty Mufflers give marked noise reduction *without back pressure penalty!*

Public clamor for abatement of truck noise can cost money if it results in wasteful re-routing of trucks or restriction of travel to specified hours only.

Donaldson Fully-Engineered Mufflers can help truck manufacturers and fleet operators with this growing problem. In unbiased tests conducted in localities where public resentment against truck noises is highest, Donaldson Mufflers were rated first in overall performance... measured both by noise reduction and back pressure. *Noise was measured by ear and instruments.*

Donaldson Fully-Engineered Heavy-Duty Mufflers are available at reasonable prices for popular models of heavy-duty trucks. Fleet operators should contact local truck dealers. Manufacturers are invited to write direct.

DONALDSON CO., INC.

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WORLD'S LARGEST MANUFACTURER OF HEAVY DUTY AIR CLEANERS

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Internal Grinding
WHEELS



MANUFACTURED
TO ORDER . . .
Rapid Delivery

Chicago Internal Grinding Wheels produce better finishes with no sacrifice of wheel life or cutting action. They're your best buy because — they're "tailor made" to your particular specifications and on their way to you within hours after you order.

Better Wheels . . . Faster

Chicago Wheel's advanced production technique assures you perfectly balanced Internal Grinding Wheels to meet today's rigid finishing requirements. Faster deliveries, too . . . and for special jobs, overnight service is available.

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mph turboprop liners within five years, 600-mph turbojet airliners within 10 years (Great Britain is getting them this summer) and 1000-mph atomic-powered airliners in the next 25 years—which is just about the sort of talk we heard 25 years ago when the airlines began flying, and talking. However, todays U. S. airline industry has assets of $818 million, operates equipment worth $349 million and has an annual payroll of $320 million, assuredly a sizeable member of the national business community. Getting down to cases, an airline transport takes off or lands somewhere in the U. S. every eight seconds of every night and every day.

Big Business—Again

Backlogs of Air Force and Navy military aircraft orders are swelling the major airframe manufacturers totals to near-World War II totals. An informal roundup shows that Boeing Airplane Co., Douglas Aircraft Co. and United Aircraft Corp. all now have orders on hand in the billion-dollar area; North American, Lockheed and Republic have about ¾-billion and Martin, Northrop, Convair, Grumman and McDonnell are around the ½-billion mark. About $50 billion worth of aircraft are now on order, a far cry from the $2 billion produced last year, but this total is going to take between three and four years to process.

One disturbing thing the industry is running into now is the fact that in some cases the services are being forced to demur on some earlier letters-of-intent. These letters normally go straight to the banks for loans for pre-production purchases but fund-cuts and schedule-revisions are resulting in some defaulting on these letters, which, to the industry, is about like the U. S. Treasury refusing to honor your dollar bill.

Tax Writeoffs

(*Continued from page 102*)

Roller Brg. Co. of America, Trenton, N.J.
Roller bearings—$1,427,461

—S—

SKF Industries, Inc., Shippensburg, Pa.
Roller, ball bearings, etc.—$886,103
SKF Industries, Inc., Philadelphia
Roller bearings, locknuts—$5,749,693
Schaefer Machine Co., Brooklyn, N. Y.
Aircraft fittings—$21,385
Slabe Machine Products Co., Cleveland
Aircraft engine parts—$23,385
Solar Aircraft Co., San Diego, Calif.
Aircraft engine parts—$445,282
Solar Aircraft Co,. Des Moines, Iowa
Aircraft engine parts—$1,694,284
South Bend Screw Products, Inc., South Bend, Ind.
Aircraft engine parts—$75,551
South Bend Screw Products, Inc., South Bend, Ind.
Turbine engine parts—$68,850
Star Tool & Die Wks., Detroit
Aircraft fixtures—$230,000
Steel Improvement & Forge Co., Cleveland
Aircraft engine parts—$169,162

(*Turn to page 142, please*)

PRECISION MADE
Pheoll
SCREWS, BOLTS, NUTS and SPECIAL FASTENERS

save assembly time
improve product strength
and final appearance



ACCURATE THREADING SAVES TIME

Pheoll Screws, Bolts, and Nuts are easier to start, easier to drive and easier to tighten—because they're accurately machined and threaded. These features cut your assembly time and cost.

COLD ROLLED THREADING ADDS STRENGTH

The grain structure and flow of metal obtained through cold heading and roll threading increases the structural strength of Pheoll Fasteners. Cold working improves thread bearing surfaces, providing greater area of contact for firmer grip. Greater strength reduces possibility of shearing, and time lost in subsequent removal and retapping.

OUR INSPECTION IMPROVES YOUR PRODUCT APPEARANCE

Step by step Pheoll inspection, through every process of production, assures uniform head size and shape; cleanly milled and recessed heads, neat chamfering and countersinking. All these factors contribute to the quality and finish which add materially to your product's final appearance. *Write* for Pheoll's product literature and price list.

THESE PHEOLL PRODUCTS INCREASE YOUR PRODUCTION RATE. Thumb Screws Machine Screws† • Wood Screws† • Sheet Metal Screws† • Stove Bolts† • Rolled Threaded Wires and Studs • Special Rivets and Pins • Brass Washers

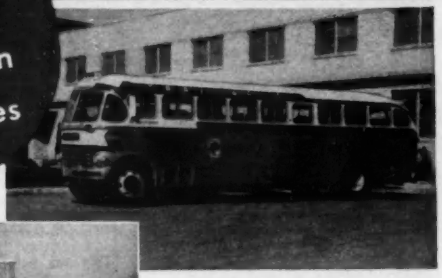
†Furnished in slotted and Phillips Recessed Head Types

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5700 ROOSEVELT ROAD
CHICAGO 50, ILLINOIS
SCREWS • BOLTS • NUTS
Industrial Fasteners and Holding Devices

THE TREND IS TO SHOCK ABSORBERS

for minimizing maintenance on springs and front end assemblies







FLEET OPERATORS REPORT

"We have been using in many of our intercity buses Gabriel shock absorbers and in our opinion they do an exceedingly good job in the heavy-duty intercity bus field." —Transcontinental Bus System, Dallas.

• • •

"Our problems centered around uncontrolled action of the front end assembly, particularly while running empty or light load. In general, we were encountering severe wear and tear on the whole front end assembly and because of Gabriel shock absorbers has virtually eliminated these conditions." —Canadian Oil Companies, Ltd., Toronto.

• • •

"We have found, over a number of years, that we have received excellent service from Gabriel Shock Absorbers. We find they stand up under heavy usage exceptionally well and keep to a minimum the wear and tear on equipment caused by hard road use." —Rodgers Motor Lines, Inc., Scranton, Pa.

Now more trucks and buses come factory equipped with shock absorbers... More fleet operators install shocks on all types of equipment in all kinds of service. Every dollar saved on maintenance goes into the profit side of your ledger. That's why Gabriel shock absorbers are definitely a profitable investment. They drastically reduce spring breakage, front end overhaul and all types of maintenance traceable to road shock. Now packaged complete with brackets, installation is simplified. Write for your copy of Gabriel Truck and Bus Shock Absorber Catalog today.



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GABRIEL
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SHOCK ABSORBERS

PAGE WIRE



LOW CARBON
HIGH CARBON
STAINLESS
SPECIAL ALLOY
ARMCO IRON

You draw the Shape
—Page can draw the Wire

—the way you want it for your production—whether it's ALL of your product, or only a part.

Cross-sectional areas up to .250" square; widths to 3/8"; width-to-thickness ratio not exceeding 6 to 1.

for Wire or Information about Wire—

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PAGE Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Tax Writeoffs

(*Continued from page* 140)

Stewart-Warner Corp., Chicago
Ordnance supplies—$503,461
Stover Lock Nut & Mchry Corp., Easton, Pa.
Safety nuts, tank track pins—$299,000
Strom Steel Ball Co., Cicero, Ill.
Steel balls—$790,000
Sundstrand Mach. Tool Corp., Rockford, Ill.
Aircraft alternator drive—$3,377,780

—T—

Thompson Industries, Inc., Mineola, N. Y.
Ball bearings—$14,129
Thompson Products, Cleveland
Jet engine parts—$4,930,000
Timken-Detroit Axle Co., Ashtabula, O.
Military vehicle axles—$4878
Timken-Detroit Axle Co., Oshkosh, Wis.
Military vehicle axles—$429,014
Timken-Detroit Axle Co., New Castle, Pa.
Military vehicle axles—$309,970
Timken-Detroit Axle Co., South-central Ohio
Transfer cases & parts—$15,650,000
Timken-Detroit Axle Co., Detroit
Military vehicle axles—$732,302
Titeflex, Inc., Newark, N. J.
Radio & ignition parts—$289,065
Torrington Co., Inc., South Bend, Ind.
Anti friction bearings—$312,549
Torrington Co., Inc., Torrington, Conn.
Anti-friction bearings—$2,136,463
Towle & Son Co., Philadelphia, Pa.
Aircraft engine instruments—$49,500
Tube Processing Inc., Indianapolis
Fuel lines—$12,425
Tyson Bearing Corp., Massillon, O.
Roller bearings—$1,216,515

—U—

United Aircraft Corp., P&W Aircraft Div., North Haven, Conn.
Aircraft engines and parts—$14,000,000
United Aircraft Corp., P&W Aircraft Div., East Hartford, Conn.
Aircraft engines—$8,400,000
United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.
Aircraft propellers—$16,800,000
United Aircraft Corp., E. Hartford, Conn.
Ordnance—$329,855
United Aircraft Corp., E. Hartford, Conn.
Aircraft propellers—$2,369,460
United Aircraft Corp., E. Hartford, Conn.
Aircraft engines—$19,847,085
United Aircraft Corp., Bridgeport, Conn.
Helicopters—$2,691,105

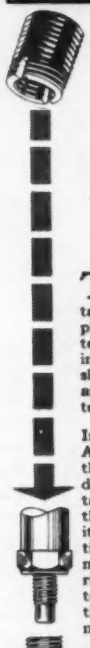
—W—

Waldorf Instrument Co., New York, N. Y.
Aircraft parts—$219,423
Weatherhead Co., Antwerp, Ohio
Aircraft hose, assemblies—$816,410
S. K. Wellman Co., Bedford, Ohio
Friction elements—$3,650,870
Wel-Met Co., Kent, Ohio
Aircraft parts, ordnance—$412,534
Westinghouse Electric, Pittsburgh, Pa.
Aircraft supplies—$24,500,000
Worthington Pump & Machinery Corp., Piscataway Twshp., N. J.
Welding equipment—$211,470
Wright Aeronautical Corp., Woodridge, N.J.
Aircraft parts—$5,334,440
Wright Aeronautical Corp., Caldwell, N. J.
Aircraft parts—$578,600
Wright Aeronautical Corp., Garfield, N. J.
Aircraft parts—$6,124,000
Wyman-Gordon Co., Harvey, Ill.
Engine crankshafts—$4,848,200

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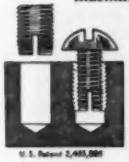
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for stronger--durable threads

The Tap-Lok Insert greatly increases the strength of tapped threads in aluminum, plastics, wood and other materials of relatively low shearing strength. By enlarging the shear area it provides a firm anchorage for threaded fastenings of various types.

Installation is easy and rapid. A simple driving tool turns the insert into a cored or drilled hole equal in size to a tap drill hole for the external thread of the insert. It taps its own thread with the cutting edges of its slotted segments. The insert remains rigidly in place because the torque to dislodge it is greater than the torque a standard machine screw can withstand.



U. S. Patent 2,465,881

The Tap-Lok Insert eliminates the uncertainties, losses and weaknesses of molded-in and cast-in inserts — improves the product at lower costs.

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B&D BENCH GRINDERS handle tool sharpening, grinding, wire brushing, buffing. Ideal when you can bring the work to the tool. Strong steel wheel guards, recessed 2-pole push-button switch, other safety features. Four models: 6" to 10" wheel diam., ¼ to 1 h.p.



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Take it from thousands of users—you'll cut costs, speed up abrasive and finishing jobs when you put Black & Decker Tools to work in your plant! Big choice of models means you get the *right* tool for *every* job. And you get such world-famous features as: (1) Dependable, full-powered motors tailor-made by Black & Decker for the tools they drive; (2) Perfect balance for easy handling, less worker fatigue; (3) Tough, longer-wearing parts for extra years of service and lower tooling costs!

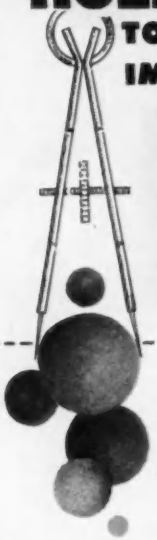
See your nearby B&D Distributor for expert help in solving your tooling problems. Write for free catalog of over 100 Electric Tools to: THE BLACK & DECKER MFG. CO., 635 Pennsylvania Ave., Towson 4, Md.

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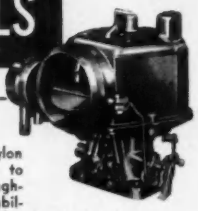
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Holley Carburetor Co., Detroit, uses Ace Nylon Balls as check valves in carburetors to permit a higher degree of spark advance.



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Set Screw & Mfg. Co.
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We specialize in Solving Puzzling Set Screw Problems.

Developments in Aircraft Production

(*Continued from page* 38)

sions must be contoured. The equipment varies from 10 tons to 350 tons in various sheet and extrusion forming machines.

The theory of stretch-wrap forming takes into consideration two fundamental mechanical characteristics of metals and alloys—elasticity and yield strength. When a 24S-T aluminum alloy test sample is placed under tension, for example, a stretch takes place. As long as the elastic limit is not exceeded, the degree of stretch remains in direct proportion to the tonnage applied. When the piece is released, it returns to normal size and shape.

But suppose tonnage is increased sufficiently to exceed the elastic limit—a condition indicated by the fact that the degree of stretch is no longer proportional to tonnage applied. Upon release the test piece will not return to its original size as it did before, but will remain deformed. During this experiment an important transformation has taken place. It is found thereafter, upon reapplying tension, the metal no longer elongates at the original yield point but resists until a factor several per cent higher is applied. Thus, by the simple expedient of stretching to the proper degree, yield strength is materially raised!

When metal is under sufficient tension to yield, it obviously is in a semiplastic condition. It is only logical to believe this plasticity would permit the workpiece to form more readily to the desired curves if suitable means were available. The Hufford system of stretch-wrap forming takes advantage of these phenomena.

A die possessing the desired contour is securely mounted and remains immovable during the forming process. The work is held in tangency to the front of the die and stretched almost to its yield point. With tension maintained, the work is wrapped around the die, accurately molding itself into and around each die configuration. Upon completion of the wrap, another stretch is applied which slightly exceeds the elastic limit of the workpiece. This second stretch "sets" the contour shape and simultaneously raises yield strength of the material. Upon release, the part retains the shape imparted by the die curves. The process is simple, fast and effective.

Economical forming of metals is achieved by the new Marform process producing deep drawn parts which are uniform in wall thickness and free from wrinkles. Developed by the Glenn L. Martin Co., the method employs a male punch and a rubber pressure pad

(*Turn to page 146, please*)

Smooth power, power that "hangs on," is assured this Lorain-50 one-yard shovel with a Twin Disc Hydraulic Power Take-Off. Another Twin Disc unit, a Model CL heavy-duty Clutch serves as a "de-clutching device" whenever a complete disconnect is desired. This same shovel also employs a Twin Disc Clutch to actuate the boom hoisting mechanism.





DESIGN FOR Power that "Hangs On"



Power "hangs on" to keep the job moving when transmitted through a Twin Disc Hydraulic Power Take-Off.

Even under severest digging conditions, even with the *output* shaft of the power take-off completely stalled, the *engine* continues to work. For the engine *cannot be stalled by digging conditions.* In fact, the engine will continue to work at its *most effective torque* until it picks up the load, or is disconnected.

Acceleration of the load is smooth and rapid since the coupling slip cushions the drive and permits sustained engine horsepower output.

And just as the fluid drive *increases* work output, it *reduces* maintenance. "Shocks" never strike solid resistance . . . digging stresses and resulting strains are "absorbed" by the Twin Disc Hydraulic Power Take-Off.

In shovels, in drag lines, in all kinds of heavy-duty construction equipment, it pays to put power to work through a Twin Disc Hydraulic Power Take-Off. Bulletin 144-B gives complete details.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

Clutches & Hydraulic Drives



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

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in a hydraulic press in which the pressure is controllable throughout the forming stroke of the press. Attached to the press and moved with the die is a cam which controls a valve to adjust the pressure. It is unnecessary to make either a female die, pressure plate, or draw ring.

Elimination of the female die saves a large percentage of the die cost and also makes possible forming the same shape from different thicknesses without changing the dies.

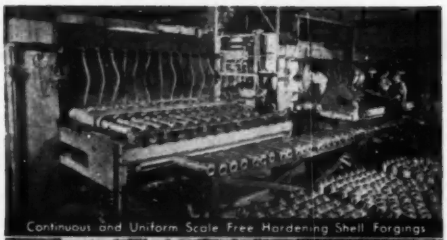
Reduction in cross-sectional area of 57 per cent for aluminum alloys is considered normal work and figures as high as 70 per cent have been obtained, whereas 40 to 50 per cent is the maximum draw for the same materials when formed on steel dies. Likewise a cup depth equal to 1½ times the radius is normally expected in the Marform process, being about 50 per cent more than that for a steel die. Material as thin as 0.010 in. has been successfully formed and a 0.012 in. cup was drawn to the point where the depth of the cup was 0.9 of its diameter. Gages as thick as 0.675 in. in aluminum alloys and 0.102 in. in 1010 steel have been formed.

Hot forming is an old art but relatively new to airframe manufacturers. In the last five years the trend has been toward the use of high strength aluminum and magnesium alloys. Whenever a gain is made by an increase in strength, a reduction in some other property, and in this case the formability, is greatly affected. Thus, in the case of 75S-T6 aluminum and FS-1H magnesium alloys, hot forming is a necessity in order to fabricate aircraft component parts. The 75S is a heat-treatable aluminum alloy which allows fabrication to be performed in the annealed ("O" condition), but in complicated shaped parts the subsequent heat treatment to the "T6" condition develops excessive warpage and check and straightening is prohibitive. Thus a saving in the order of 60 to one can be realized by hot forming in the "T6" condition. FS-1H is a work-hardenable magnesium alloy so, in order to maintain the high strength and form to tight limits, hot forming solves the problem.

Fig. 7 shows the application of an electric resistance heating unit heating 75S-T6 extrusions to 300 F in order to fabricate in the hard condition. The machine on the right is preheating the extrusion and the machine on the left is forming the part shown in the center.

All extrusions at Northrop are ordered in the full hard condition and formed as such by the hot forming method. This method gives closer tolerances in the parts and prevents the necessity of straightening after the heat treating operation which would have been necessary had the part been formed in the soft or SO condition.

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for any Process, Product or Production
THE ELECTRIC FURNACE CO.
WILSON ST. at PENNA. R. R. Salem - Ohio

LPG Conversion System for Reo Gold Comet Engine

(Continued from page 45)

pressure tank.

To complete the installation the mixing valve is installed directly over a King-Seeley velocity governor to provide the same overspeed protection as on standard engines.

From the standpoint of engine performance and fuel economy, considerably more field experience will have to be gained before the advantages of LPG can be exploited fully. In the present set-up there is a small percentage gain in engine output, compared with the standard gasoline engine, the LPG conversion making it possible to deliver 144 bhp at 3200 rpm governed speed.

Further gains in specific fuel economy depend upon an accumulation of field experience. At the present time the major gain in fuel economy is derived from the currently lower cost of LPG fuel, around 5¢ per gallon less than gasoline. So long as this present differential in fuel cost exists, heavy duty hauling operations will show considerable fuel saving and can well justify the added cost of engine conversion.

Apart from gains to be made in fuel cost, the most important advantage of LPG operation comes from the clean burning of the fuel, resulting in almost complete combustion with carbon formation virtually nonexistent. Moreover, according to current reports LPG fuel has no tendency to form varnish or sludge, thus materially reducing the formation of combustion chamber deposits and ring sticking. At the same time there is no evidence of liquid entering the cylinders during cold starts. This promises freedom from crankcase oil contamination, thus prolonging the life of the lubricant and making possible the use of lubes of lower viscosity.

The report by Brown (AUTOMOTIVE INDUSTRIES, Feb. 15, 1951) indicates that the net effect of these salutary operating conditions is to reduce engine wear and cylinder erosion, increasing the mileage intervals between engine overhaul by some 50 per cent, and doubling the mileage between engine oil changes.

As a matter of fact, the mechanism of what happens in the engine cylinder when burning LPG fuel is so different from its behavior with gasoline that Reo has found it necessary to replace the chromium-plated top piston ring with an uncoated cast iron ring to promote faster break-in of rings. That is another of the special features of the conversion kit.

Finally, it may be noted that plumbing complications have been held to the very minimum, the only added lines being the two water connections between the regulator and water pump.

for

BORON STEELS

GRAINAL TREATMENT
meets new specifications

To meet the requirements of boron-treated steels, use Grainal Alloys—metallurgically engineered multiple-element ferro-alloys containing boron.

The combination of elements in these alloys is *most effective* and produces *extremely uniform* results in raising the hardenability of very low alloy steels.

Nominal compositions of three grades available:

Vanadium Grainal No. 1		Vanadium Grainal No. 6		Grainal No. 79	
Vanadium	25.00%	Vanadium	13.00%	Aluminum	13.00%
Aluminum	10.00%	Aluminum	12.00%	Titanium	20.00%
Titanium	15.00%	Titanium	20.00%	Zirconium	4.00%
Boron	0.20%	Boron	0.20%	Manganese	8.00%
				Boron	0.50%
				Silicon	5.00%

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It's not really magic, of course. Simply a scientific understanding of your need for a critical pliable part. It may be a seemingly "impossible" part . . . completely unusual in physical properties and operational characteristics. But, it is a part you *must* find to complete your mechanism.

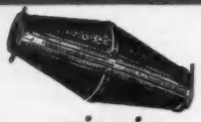
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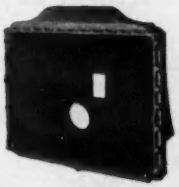
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In nearly fifty years of production for civilian requirements, and in producing military orders during two world wars, we have become preconditioned to change. We *have* manufacturing flexibility to meet wide variations in the designs of clutches, radiators, torque converters and oil coolers.



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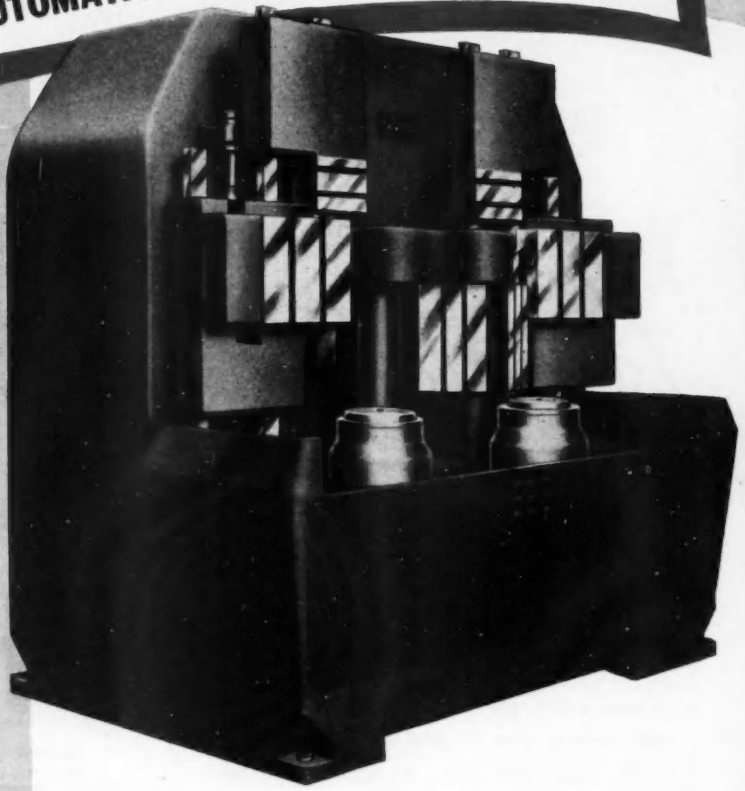
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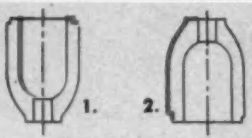
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MULTI-SLIDE AUTOMATIC • Single or Double Spindle Operation

for *High Production*
TURNING, BORING and FACING





2-SPINDLE MACHINE

No. 1 — on one spindle
No. 2 — on other spindle

PART—3" dia. shell

— No. 1 —

Operation — Contour bore I. D.
Turn step on O. D.
Face open end

Estimated production — 137 per hr. @ 100%

— No. 2 —

Operation — Contour turn O. D.
Face other end

Estimated production — 137 per hr. @ 100%



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Same operation on both spindles

PART—13" dia. flywheel

Operation — Bore, counterbore and chamfer

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You can simplify operations and get more out of your machine hours by using the Motch & Merryweather heavy duty *Hydra-Turn* for precision turning, boring and facing on single or double spindle applications. It excels for chucking operations or work on center. You profit from fast loading, tool accessibility, easy chip disposal and less operator fatigue. Production is multiplied with fewer machines, saving floor space.

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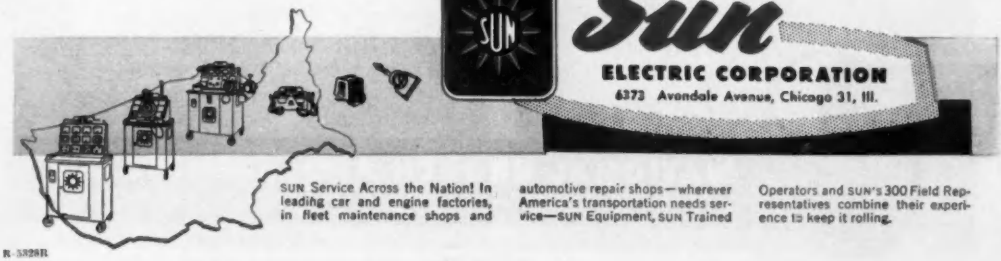
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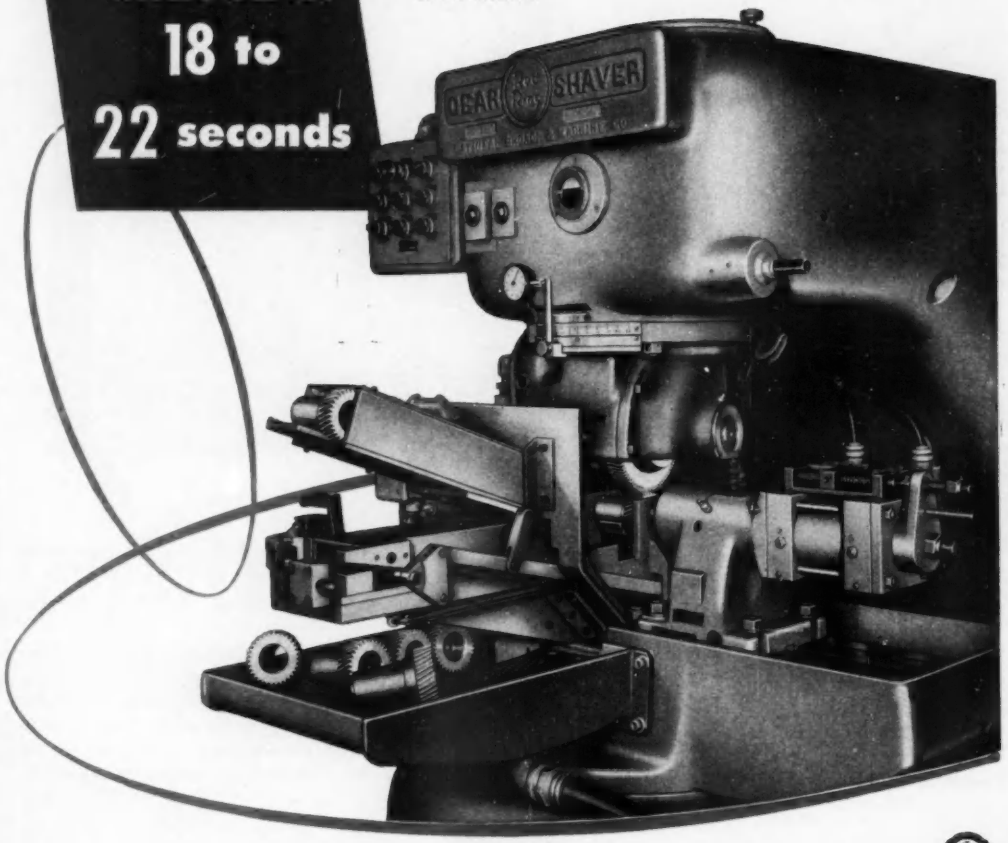
Transmission Gears

shaved in 18 to 22 seconds

The gear on this automatic transmission reverse drive sleeve is 2⅜" in diameter with a ⅞" face, 33 teeth and 14 normal D.P.

It is being shaved on this Red Ring Diagonal Gear Shaving Machine equipped for fully automatic loading at a rate of from 165 to 200 per hour, removing .0025" to .0015" of stock on tooth thickness. Rates up to 300 per hour have been recorded on smaller automotive transmission gears.

Automatic loading gives you not only the highest production rates, but it also minimizes operator fatigue and assures extremely close tolerance gears with ordinary machine operators—no special skill is needed.



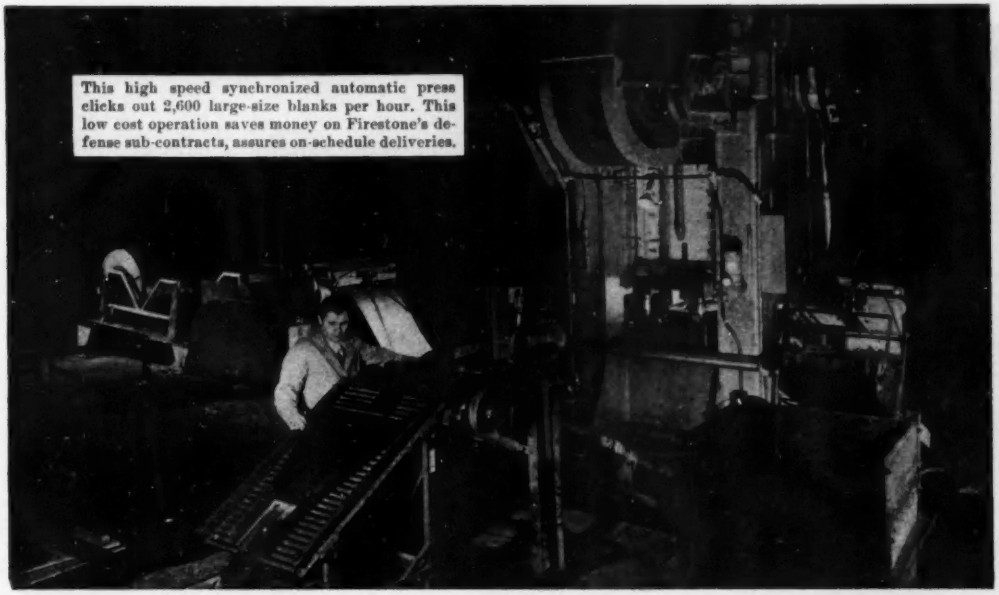
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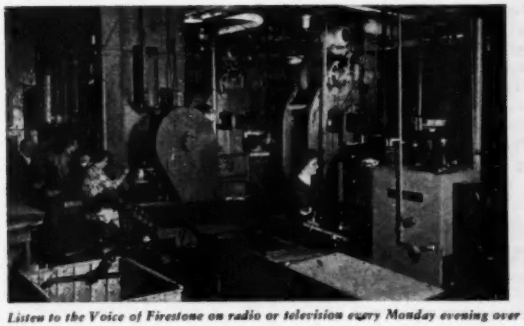
From the presses parts move on conveyors through this tunnel to be washed, bonderized, painted and oven-baked in one continuous automatic operation.

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Huge, heavy tonnage, large-bed-area presses speed drawing and forming. Four operations can be performed at one time. Reduced handling means faster production, lower costs.



Assembly operations are closely integrated with presses. In the background three operators handle forming operations on one of the new multi-operation presses.



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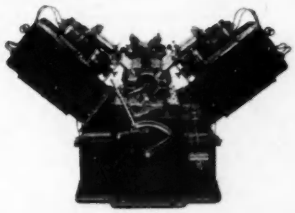
Our six plants produce sleeve bearings in all designs and sizes; cast bronze bushings; rolled split-type bushings; bi-metallic rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars.

- **BETTER VALVE SEATS** — faster with **WATERBURY-HALL** grinders
- **COMPLETE LINE** production type and service shop equipment
- **ENGINEERING** facilities for your valve seat grinding problems

WATERBURY-HALL

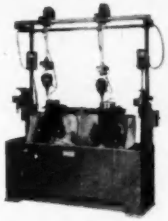
Specialists in

VALVE SEAT GRINDING



AUTOMOTIVE

Waterbury-Hall Multiple Spindle Grinder as used for production grinding of valve seats by Ford, Chrysler, GM, Willys, International Harvester, Cummins and other leading engine builders.



AVIATION

Waterbury-Hall Aircraft Seat Grinder as used for production and service on aircraft engines by Continental, Lycoming, U.S.A.F., leading airlines such as Capitol, American, United and others.

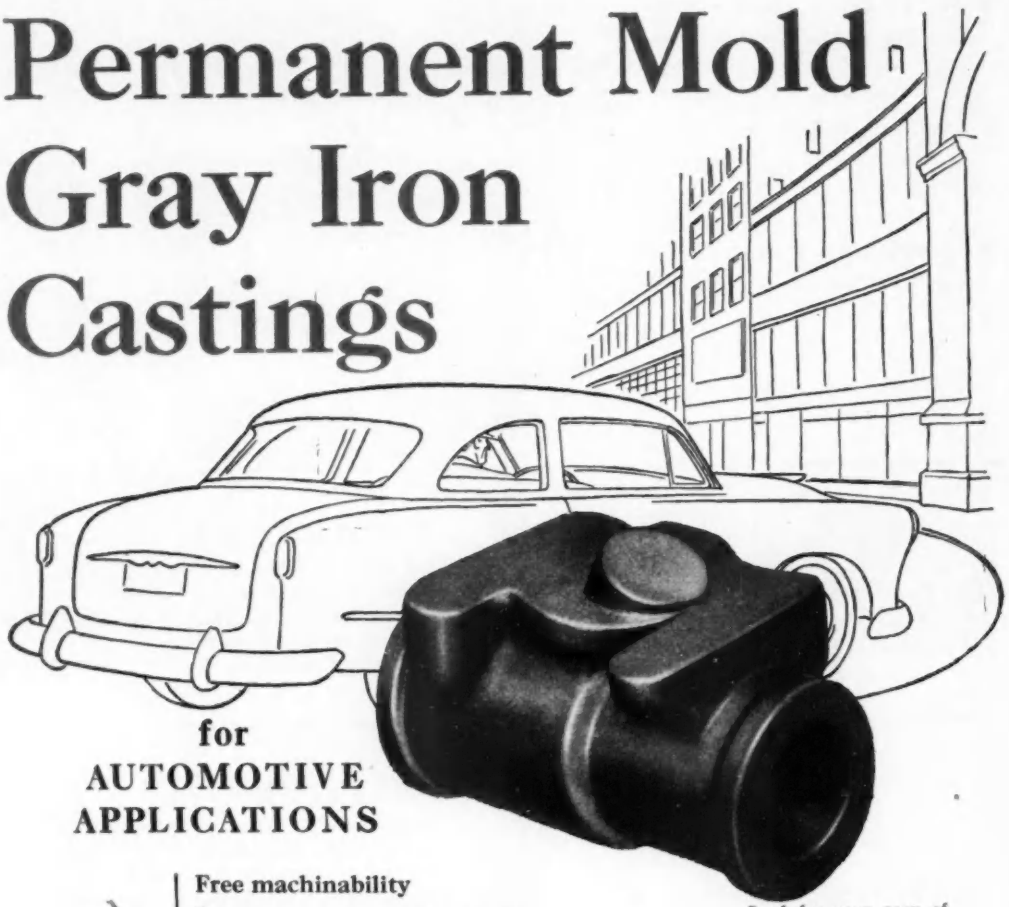


DIESEL

Waterbury-Hall Diesel Type Seat Grinder as used for production and service on diesel engines by American Locomotive, Baldwin, New York Central RR, New Haven RR, U. S. Navy and others.

WATERBURY TOOL DIVISION VICKERS INCORPORATED *A SUBSIDIARY OF THE SPERRY CORPORATION* **160 AURORA ST., WATERBURY 20, CONN.**

Eaton Permanent Mold Gray Iron Castings



for AUTOMOTIVE APPLICATIONS

- Free machinability
- Dense, non-porous structure
- Uniform structure throughout the casting
- Freedom from leakage under pressure
- Machines to high, mirror-like finish
- Properly annealed; no growth or distortion after machining

Send for your copy of the illustrated booklet, "A Quick Picture of the Eaton Permanent Mold Process for Producing Gray Iron Castings."

EATON MANUFACTURING COMPANY

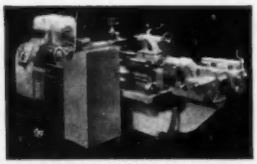
CLEVELAND, OHIO

FOUNDRY DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



Get the Point?



Monarch Series 60 Lathe with Monarch-Keller controls. These controls can be factory-applied to all Monarch Engine and Toolmakers Lathes, 14" size and up.

You're looking at the stylus of a Monarch-Keller Form Turning, Boring and Facing Machine. Wherever you spot an installation, you'll get the point immediately—here's a shop using modern duplicating methods to reach peak production at maximum profit. Here's a shop reproducing template contours to tolerances of .001" or less. And here's a shop with work coming through *fast* (we can substantiate actual time savings of 400–500%!). It's a good point, if it's in *your* shop. But it's tough, if it's competition.

Many advantages are offered by this first of all tracer controlled turning methods—in which Monarch has now accumulated 21 years of experience. Range and metal removing capacity are in no way limited by controls. It provides a unique universal stylus movement, thus effecting substantial time savings on many work pieces. It is recommended for the more intricate shaped molds and dies, for form rolls and for many intricately shaped parts.

Let us point out too, that only Monarch can deliver your choice of three tracer controlled duplicating systems according to your needs. They are fully described in the three booklets mentioned in the coupon. Just indicate your interest, and we'll send you the ones you wish. *The Monarch Machine Tool Company, Sidney, Ohio.*



Push button control cabinet (above), electric tracer and magnetic clutches constitute system. It can be instantly disconnected for regular lathe work under manual control.

Monarch
TURNING MACHINES

ACCURACY • ECONOMY • LONG LIFE

FOR A GOOD TURN FASTER...TURN TO MONARCH

THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio

Gentlemen: Please send without obligation the following complete Bulletins:

- ☐ Bulletin No. 2401—Monarch-Keller Controls
- ☐ Bulletin No. 2606—The Monarch Air-Gage Tracer
- ☐ Bulletin No. 2302—The Monarch Motor-Trace

NAME _____ TITLE _____

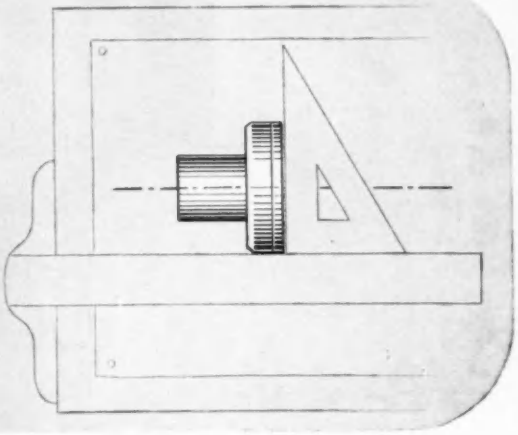
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Value Beyond Expectation!







MALLORY SILVER CONTACTS

Fine and coin silver, while having desirable properties for many applications, do not provide the physical properties required for some applications. To cover these applications, Mallory has developed a series of silver base alloys. These alloys have such improved characteristics as greater resistance to wear, less sticking or metal transfer, and greater hardness. Mallory is fully qualified to recommend the best contact material for your design. Write today.

Savings and New Precision In Composite Contacts *Result from Mallory Research*

Better performance and substantial savings for customers have resulted time and again from Mallory pioneering in the metallurgy and fabrication of contacts.

One recent Mallory development is a precision method for brazing silver or silver alloy discs to a base metal backing . . . holding the finished assembly to such close tolerances that machining is not required to square-up the finished piece. Compared with the high material cost of solid silver contacts . . . or the expensive finishing operation usually required in composite assemblies . . . this development permits important cost reductions for Mallory customers.

That's value beyond expectation!

Mallory contact know-how is at your disposal. What Mallory has done for others can be done for you.

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Electrical Contacts and Contact Assemblies

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

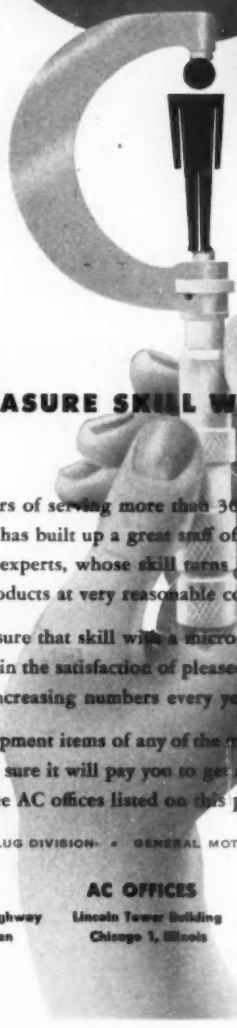
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WHEREVER
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SPECIFY
PROTECTIVE COATINGS
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DOW CORNING SILICONES
for maximum weather resistance, excellent gloss and color retention plus stability at 500°F. to 1000°F.
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AC QUALITY PRODUCTS



YOU CAN'T MEASURE SKILL WITH A MIKE

After many years of serving more than 300 equipment customers, AC has built up a great staff of engineering and manufacturing experts, whose skill turns ideas and materials into quality products at very reasonable cost.

You can't measure that skill with a micrometer—but you can measure it in the satisfaction of pleased customers, who employ it in increasing numbers every year.

If you use equipment items of any of the many types produced by AC, we feel sure it will pay you to get in touch with one of the three AC offices listed on this page.

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

AC OFFICES

1300 North Dort Highway
Flint 2, Michigan

Lincoln Tower Building
Chicago 1, Illinois

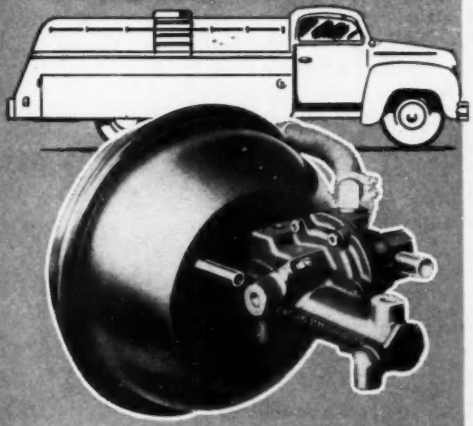
General Motors Building
Detroit 2, Michigan

AC CURRENTLY MANUFACTURES:

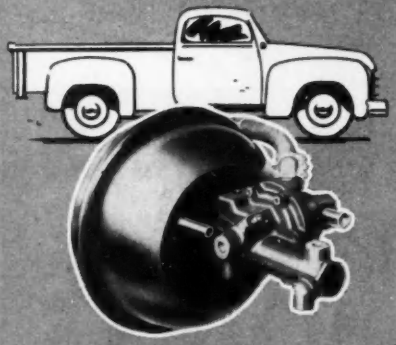
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AMMETERS
BREATHERS (Crankcase)
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DIE CASTINGS (Zinc)
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GAUGES—GASOLINE
GAUGES—OIL (Pressure)
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OIL FILTERS (Lube)
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LARGE TANDEM HY-POWER
for 2½-3 Ton and Larger



MEDIUM HY-POWER
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SMALL HY-POWER
for ½-¾-1 Ton

MIDLAND
VACUUM
HY-POWER
Better Power Brakes for Every Size Truck

● Engineered for top performance, Midland Vacuum Hy-Power assures maximum braking efficiency for any size truck from the smallest pick-up to big 3-ton and larger vehicles.

Midland Vacuum Hy-Power offers superior features—tested and proved in years of service:

Extra power—quicker, safer stops with less driver effort.

Dependable year 'round operation regardless of weather. Sealed and protected from water, dust, dirt, rust or corrosion.

Simple to install. Can be located any available place on chassis. Does not interfere with operation of standard hydraulic system.

Compact—rugged in construction—*never needs lubrication.*

Available in complete packaged kits—for every size truck. See your nearest Midland Distributor—or write or phone us for complete information.

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Air and Vacuum
POWER BRAKES



World's Largest Manufacturer of
AUTOMOBILE and TRUCK FRAMES



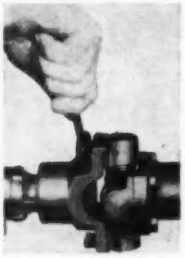
Air and
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DOOR CONTROLS





—with a wrench

to turn down the lock plates and remove the bolts — and to tighten and lock them again.



Car and truck manufacturers recommend that universal joints be removed, cleaned, relubricated and replaced at regular, specified intervals. The down-time required for this operation can be reduced from hours to 15 minutes—by equipping your car or truck with MECHANICS Roller Bearing UNIVERSAL JOINTS. The flange-type bearing assembly can be lifted out, simply by removing the screw bolts. Because keys and keyways are ground to fit there is no danger of destroying the original accurate alignment and balance. Let our engineers show you how this and other exclusive features of MECHANICS Roller Bearing UNIVERSAL JOINTS will give your car or truck competitive advantages.

—and a hammer

to tap the tops of the bearings lightly, to release them — and to compress the cork packing between the bearings and trunnions when the joint is reassembled.



MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Avenue, Rockford, Illinois



MECHANICS

Roller Bearing

UNIVERSAL JOINTS

For Cars • Trucks • Busses and Industrial Equipment

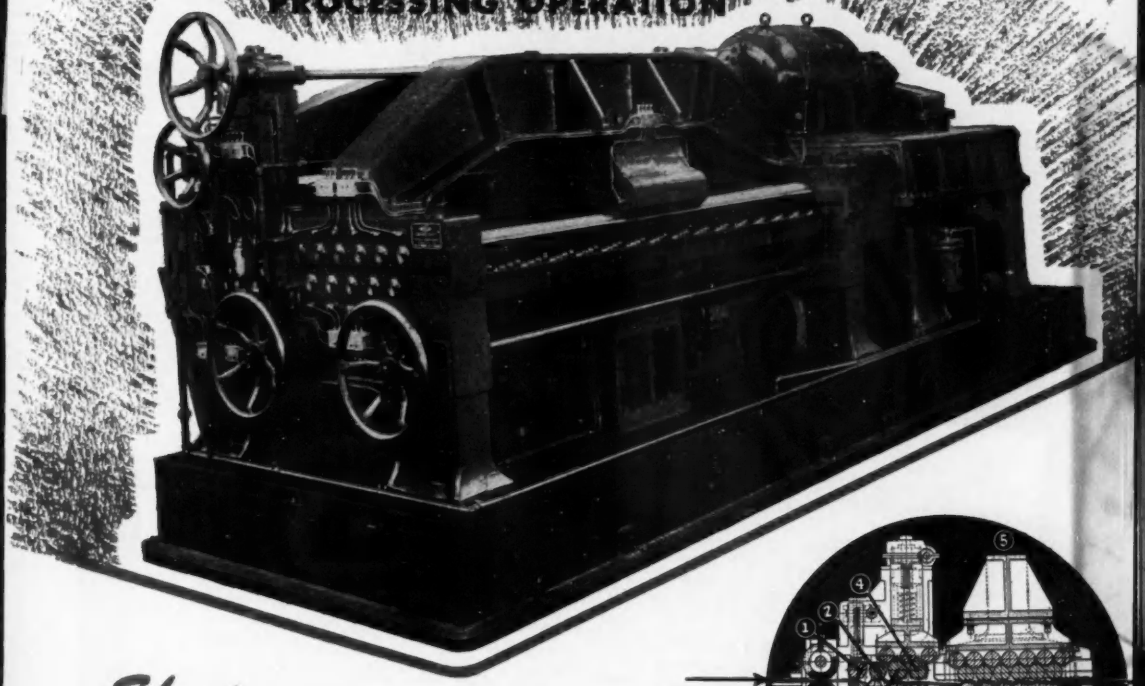
TO THE *Stamping Trade:*

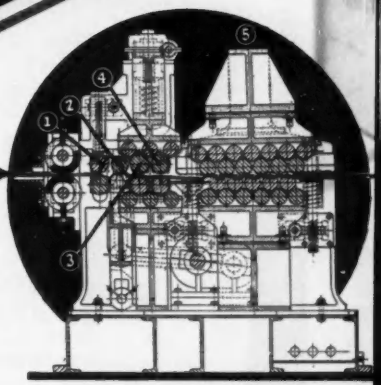
IF YOU ARE PRODUCING HIGHLY FINISHED DIE DRAWN PARTS

You cannot afford to be without the benefit of a

BUDD-McKAY

PROCESSING OPERATION





(1) Represents Hold-back Rolls
(2) Flexing Roll
(3-4) Double pair Pulling Rolls
(5) Backed-up Leveling Roll Unit

Sheets processed in the Budd-McKay Sheet Processing Machine are free of stretcher strains. For this reason they have far superior stamping and drawing qualities, and retain these qualities much longer than sheets processed by any other method.

Incidentally **HAVE YOU REVIEWED YOUR METAL FINISHING COSTS LATELY?**

The **McKAY MACHINE** *Company*

McK

YOUNGSTOWN, OHIO



"Wonder how many there'll be in 1960?"

You guess! 50 Million? 60 Million? Whatever the number, they will surely be *better* cars . . . safer, more comfortable, and more efficient.

And what will make them better? Among other important factors, improved *castings*. Even now, cast camshafts, cylinder blocks and heads, pistons and other automotive castings are being designed for the engines of the future. These castings will be of advanced design, with greater strength and wear resistance and better machinability. These castings are being developed *now* by the largest independent contracting foundry in the world . . . Campbell, Wyant and Cannon . . . *where advanced metallurgical engineering, precision control, and mechanized production assure the highest quality castings at lowest cost.*

CAMPBELL, WYANT AND CANNON FOUNDRY COMPANY, MUSKEGON, MICHIGAN

Foundries in Muskegon, South Haven and Lansing, Michigan

CWC

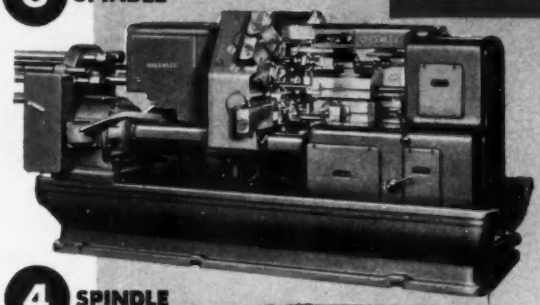
Since 1908

. . . serving the automotive, farm equipment, railroad and marine industries and the Armed Forces.

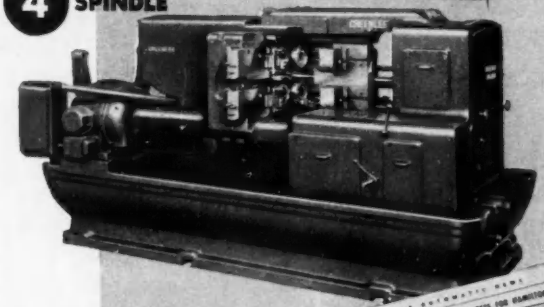
CAST CYLINDER HEADS AND BLOCKS · CAST PISTONS · CAST CAMSHAFTS · CAST CRANKSHAFTS · CAST GEARS · CENTRIFUGALLY CAST CYLINDER LINERS · CENTRIFUSE BRAKE DRUMS

GREENLEE AUTOMATICS

6 SPINDLE



4 SPINDLE



Maximum economy of operation on long-run jobs, with an uncluttered, easily-reached tooling area that allows rapid and accurate positioning of tools and attachments . . . permitting precise inspection of work finish and tolerances *on the machine.* The Greenlee "Six" is available in 1″, 1-5/8″, and 2″ capacity — the "Four" in 1-5/8″ and 2-5/8″ capacity.

PRODUCTION MACHINERY

GREENLEE

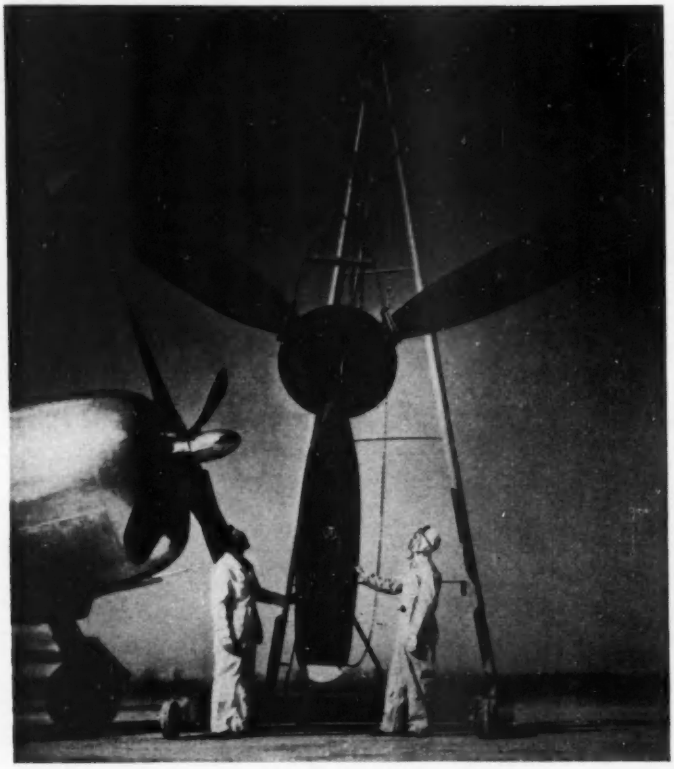
Automatic News

These free monthly issues are written expressly for those of you who are concerned with various phases of automatic screw machine production. They contain practical and informative articles dealing with tooling and maintenance, generously illustrated with drawings and photographs. If you wish your name added to our mailing list, send your request, on company letterhead, to:

The Editor, *Automatic News*

GREENLEE BROS. & CO.
1735 Mason Ave., Rockford, Illinois

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES





THE CONVAIR B-36 *and the RB-36 (shown above) have six Curtiss propellers, like the one at the left, which is the world's largest production model.*



THE MACHINE. *This drill press, equipped with air operated ram and timer, provides the power and automatic operation for brushing the hub bearing. This machine and accessories were on hand, making it possible to get into production in a hurry.*

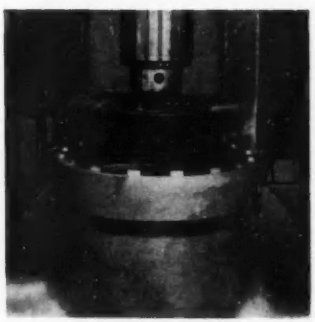
What's this 3-bladed approach to speed defense production?

...a brush! It saves time . . . cost . . . space.

The Propeller Division of the Curtiss-Wright Corporation had a problem. It had to clean and finish a shot-peened bearing area inside the hubs of its propellers. It appeared this vital operation would require large, elaborate equipment, costly jigs and considerable time getting into production.

Then, with the help of their **O**sborn **B**rushing **A**nalyst, a method was worked out to do it with power brushing. By mounting an Osborn Monitor® Brush on a simple drill press adapted for the job, they are getting excellent finishes at high speed.

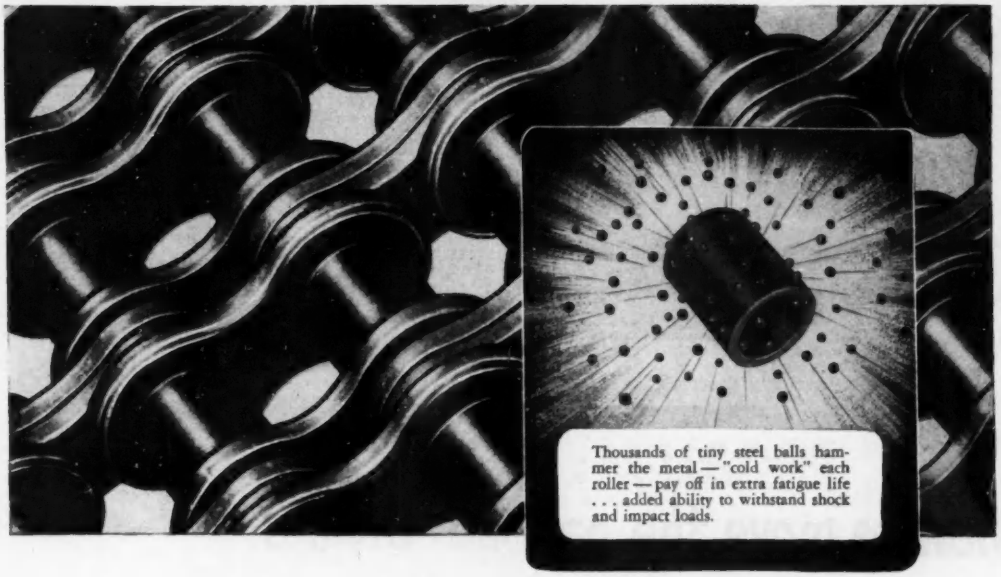
This is another example how Osborn power brushing can help simplify and speed production jobs. Your **O**sborn **B**rushing **A**nalyst will gladly assist on any defense tooling-up problems involving product cleaning or finishing. *Write Dept. 449, The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



THE BRUSH. *This Osborn Monitor Brush, rotating at 900 r.p.m., feeds into the hub, removes loose particles and smoothes the surface of the shot-peened bearing area (and cleans the threads shown at the top of the hub). Various diameters of brushes are used to suit the hub sizes.*

OSBORN

LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS



Why you should be sure the roller chain you buy has

SHOT-PEENED ROLLERS

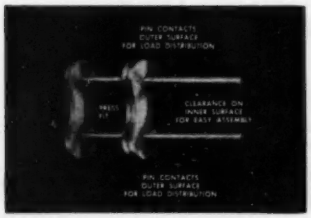
. . . one of the extra-strength features you get with every LINK-BELT Roller Chain

LOOK for the distinguishing darkened rollers on every roller chain you buy! They're your guarantee of extra fatigue life.

Shot-peening is just one of the added manufacturing refinements that make Link-Belt Precision Steel Roller Chain a longer-life chain. Controlled material selection and heat treating assure absolute uniformity . . . no weak members.

Link-Belt Roller Chain is available in single or multiple widths, in ⅜ to 3 in. single and double pitch. For the best in roller chain, get in touch with your nearest Link-Belt office.

Easier coupling and uncoupling without sacrificing load distribution

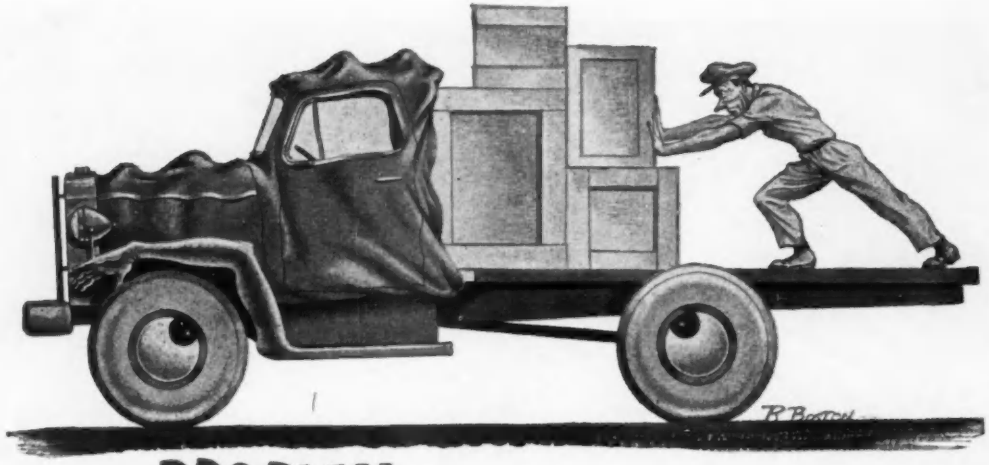


Patented E-Z Assembly feature of Link-Belt Precision Steel Roller Chain has won world-wide approval. Coupling and uncoupling of multiple width chains—right on the job—is far easier. There's absolutely no sacrifice of load distribution . . . no loss of the chain's remarkable performance. Press-fits between chain pins and middle bars have been modified. But full load-carrying capacity across the entire width of the chain has been maintained.

LINK-BELT

PRECISION STEEL ROLLER CHAIN

LINK-BELT COMPANY: Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities. 52.203



PROBLEM:
How to move the payload forward —

Saginaw Steering has once again come up with the *right* answer. Another major profit-eating hauling problem has been solved.

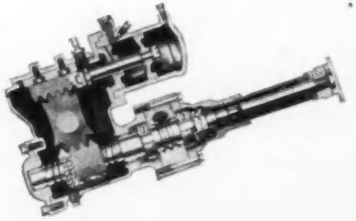
Use of Saginaw's revolutionary new hydraulic power steering gear permits up to *double* the usual front axle payload . . . brings easier, safer steering *plus* new payload profits—with no increase in truck size . . . no danger of exceeding legal load limits.

Saginaw power steering has an outstanding record of efficient, trouble-free operation behind it . . . is built by the largest manufacturer of steering equipment in the world.

Find out how Saginaw Hydraulic Steering can boost the payload potential on your trucks . . . help you to *sell* more trucks. Write us for complete details.

IF IT'S EASY TO STEER—IT'S A SAGINAW GEAR

ANSWER: Install SAGINAW hydraulic power STEERING GEAR



Saginaw

STEERING GEAR DIVISION

General Motors Corporation, Saginaw, Michigan

PRODUCTS

STEERING GEARS AND LINKAGES • PROPELLER SHAFTS • TRANSMISSION CONTROLS • TURN SIGNALS • DIESEL ENGINE PARTS • BALL BEARING SCREW AND NUT ASSEMBLIES • AUTOMOBILE JACKS

CECO-DROP



The rapid striking action of the Ceco-Drop, the quick getaway of its ram after striking and the hammer's low center of gravity, insuring accuracy of die match, are some of the reasons why forge shops equipped with Ceco-Drops show increased production, more uniform accuracy and lower costs than with conventional gravity drop hammers.

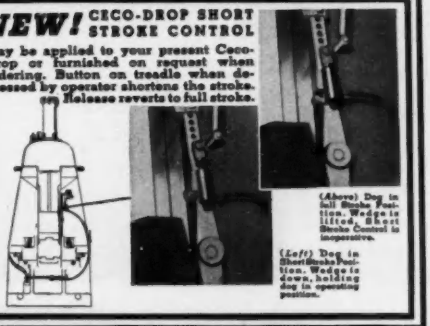
Write for Bulletin 30-L-0

CHAMBERSBURG ENGINEERING CO.

CHAMBERSBURG, PENNA.

NEW! **CECO-DROP SHORT STROKE CONTROL**

May be applied to your present Ceco-Drop or furnished on request when ordering. Button on treadle when depressed by operator shortens the stroke. On Release reverts to full stroke.



(Above) Dog in full Stroke Position. Wedge is lifted. Short Stroke Control is inoperative.

(Left) Dog in Short Stroke Position. Wedge is down, holding dog in operating position.



Since 1932 . . .

more than 60,000,000 K. S. Electric Telegages (water temperature, fuel level and oil pressure) have been produced for the keenly competitive, highly critical automotive market.

To maintain this leadership and progressively improve these instruments King-Seeley carries on a consistent program of engineering research and development. Among these improvements is the design change which enables the Telegage to withstand continuous vibration in two planes for eight hours at vibration rates ranging from 0 to 4,000 per minute.

Another is the introduction of spun glass insulation for heater wires to protect the circuit against damage from current surges and shorts.

Still another is compensation for voltage variation. Such variation may range from 5 to 9 volts without interfering with the accurate performance of the Telegage.

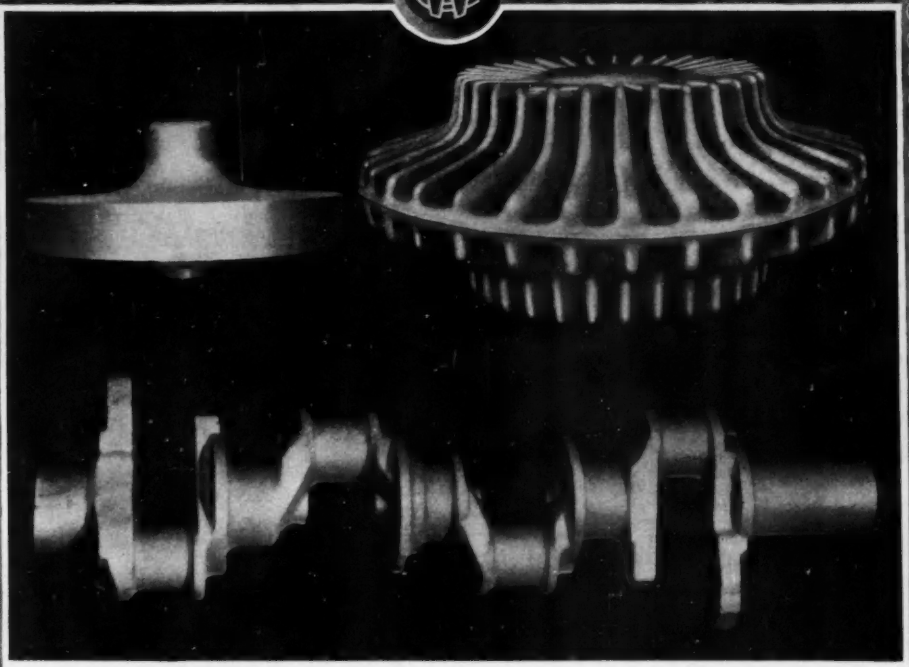
For the last five years King-Seeley has operated under a carefully organized Quality Control System which has materially improved the standards of workmanship and the uniformity of Telegages.

Besides the conventional inspections all tank unit diaphragm stock is tested to 1,000,000 cycles and stock for oil pressure diaphragms to 10,000,000 cycles. All stock has to pass these tests to be accepted.

As Research discovers better designs, better manufacturing methods and better materials, these also will be incorporated in the K. S. Telegage.



KING-SEELEY CORPORATION
ANN ARBOR, MICHIGAN
PLANTS AT ANN ARBOR, SCIO, AND YPSILANTI



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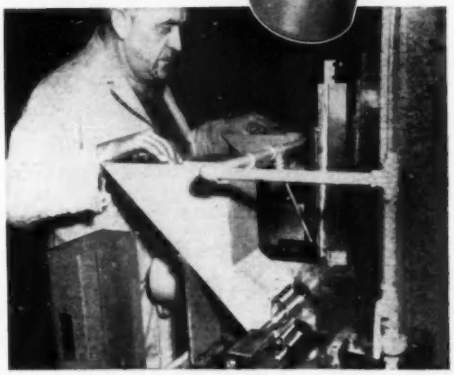


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To broach radius notches in automotive piston pins, American engineers designed a *completely automatic* two station fixture featuring *continuous cycling.* Each station broaches two parts. Installed on an American T-4-24 Broaching Machine, equipped with a special work table, this fixture permits broaching four parts simultaneously . . . produces more than 1150 parts per hour.

SIX AUTOMATIC OPERATIONS ENGINEERED IN CONTINUOUS CYCLE FIXTURE

The operator has only to keep the gravity-type loading hopper filled with parts. A transfer pusher pushes two parts at each station into position where they are hydraulically clamped in V nests. The main slide starts down broaching the four parts simultaneously. At the end of the stroke the transfer pushers push the part into a chute in the center of the machine where they are ejected. The transfer pushers and broaches return to the starting position and the cycle repeats. All operations are electrically interlocked.



SOLVE YOUR BROACHING PROBLEMS THE *American* WAY

Continuous, automatic cycling is only one way that American engineers help manufacturers get high production. Perhaps an American-engineered installation will increase production in your plant. To get American's recommendations send a part print or sample and hourly requirements.

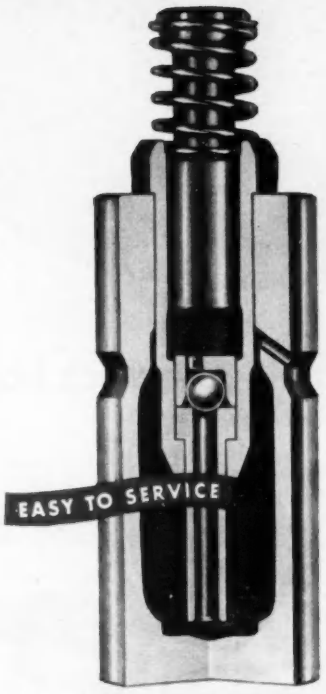
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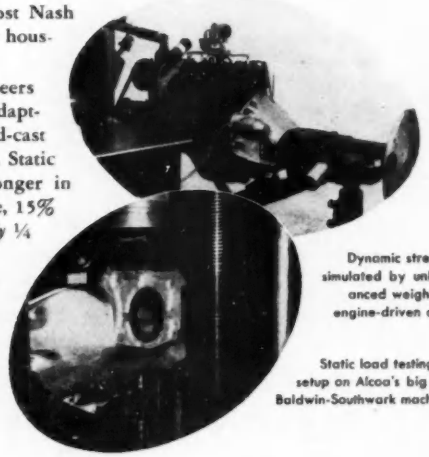
Imagineering WITH ALUMINUM

switched Nash to a die-cast clutch housing

The finished permanent-mold aluminum clutch housings cost Nash less than cast iron. But they wondered . . . wouldn't die-cast housings save still more?

The problem was to get strength economically. Nash engineers talked it over with Alcoa development men. Together, they adapted design and alloy to the die-casting process. We made sand-cast samples. Machined them to die-casting design dimensions. Static and dynamic load tests proved the new design 25% stronger in shear, 10% stronger in bending, 100% better in fatigue life, 15% lower in cost than the permanent-mold housing . . . *with only ¼ the weight of the original cast-iron housing.*

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Dynamic stresses simulated by unbalanced weight on engine-driven disk.

Static load testing setup on Alcoa's big Baldwin-Southwark machine.

ALCOA

First in Aluminum

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Syntech* rubber-covered O. D. Oil Seals that have a proved-performance record in rugged Off-Highway Vehicles

Illustration courtesy of Willys-Overland Motors, Inc.

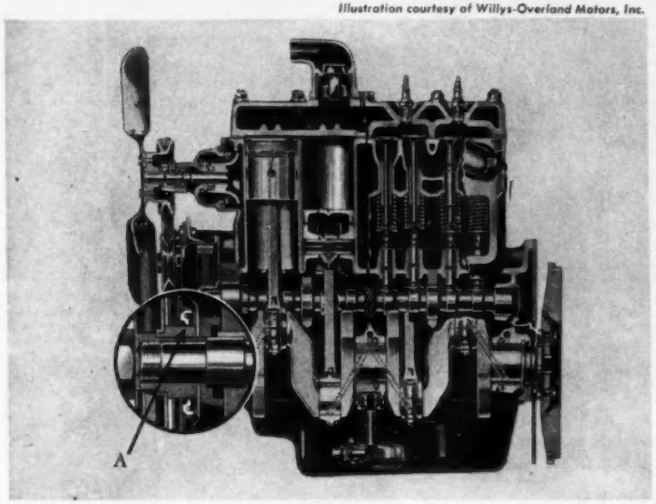


Figure 1. Section through "L-Head" engine. Enlargement shows position of National Oil Seal (A)

Vehicles designed for off-highway use must be built to take the roughest treatment under the most gruelling conditions. In such applications the oil seals in all positions meet their most exacting tests for dependability. A case in point is the front main crankshaft seal used on the engine of the Universal Jeep, built by Willys-Overland, which has been put through every manner of rough treatment.

The illustration (Fig. 1) is a section through the Universal Jeep L-Head "Go-Devil" Engine, showing, close up, the location of the oil seal (A) which retains the crankcase lubricant. The compactness of the entire engine places extreme limitations on the size of this oil seal. Efficiency and dependability are extremely important in this application because the equipment must be capable of dependable operation over unpaved, rugged terrain. The oil seal may be heavily flooded going down steep inclines and oil-starved going up. Furthermore, when in the field proper servicing may be neglected for long periods.

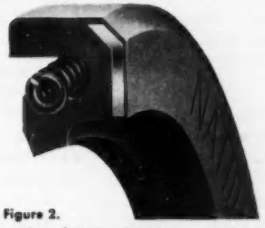


Figure 2.
Cross-section of National Rubber-covered Oil Seal

On applications such as this, National Syntech rubber-covered sealing units are a close approach to the ideal. Essentially these seals consist of a sealing member which is bonded to a steel structure at the time of molding. This method of fabrication makes it possible to produce a seal possessing high performance capabilities but requiring the minimum space.

The section drawing (Fig. 2) is of one of the seals being used on the Universal Jeep built by Willys-Overland. Despite its compactness this seal incorporates the basic, limited-contact, spring-tensioned lip design used on many larger National Oil Seals. This design, operating in well-lubricated areas, provides "zero-leakage" performance with the minimum of drag. The rubber O.D. forms an effective seal around the outer periphery. Basically it is a slightly altered regular National 350,000 series seal.

National engineers will be happy to cooperate with you in solving your sealing problem. Many times standard designs can be utilized with resulting savings in tooling costs which are sometimes required on special designs.

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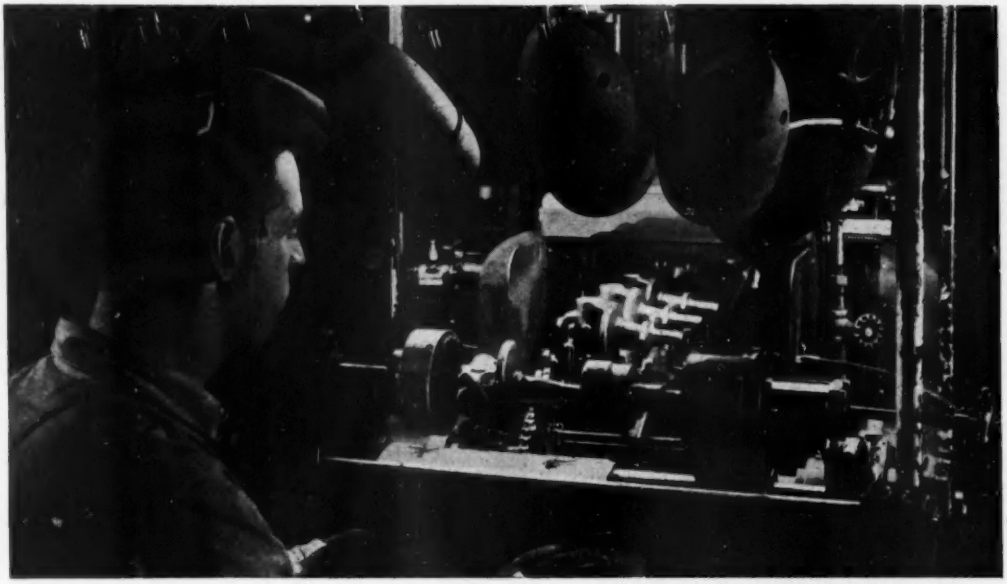
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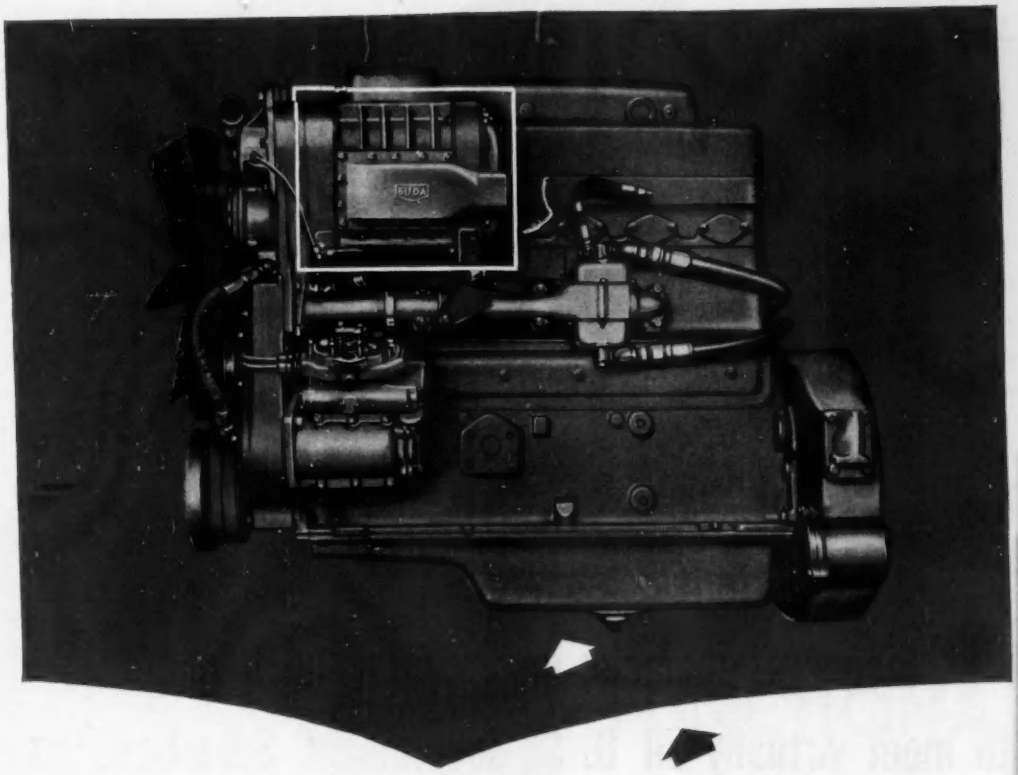
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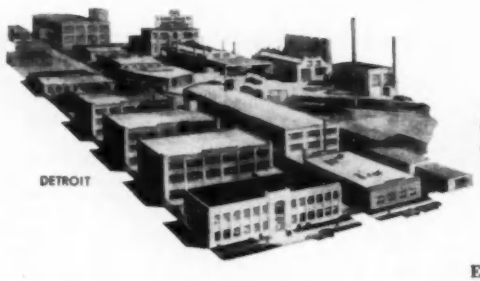
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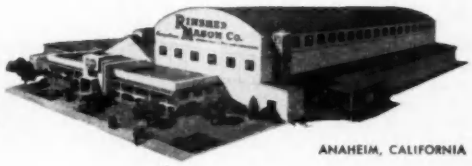
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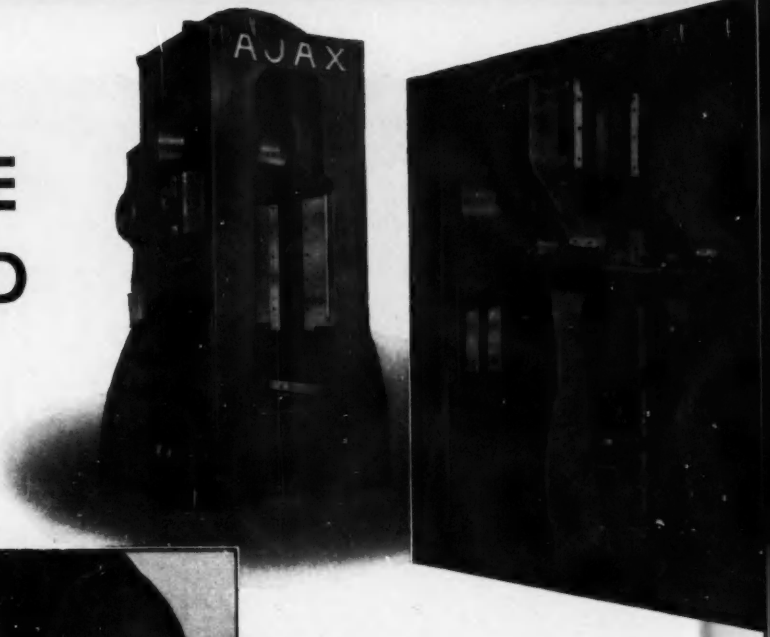
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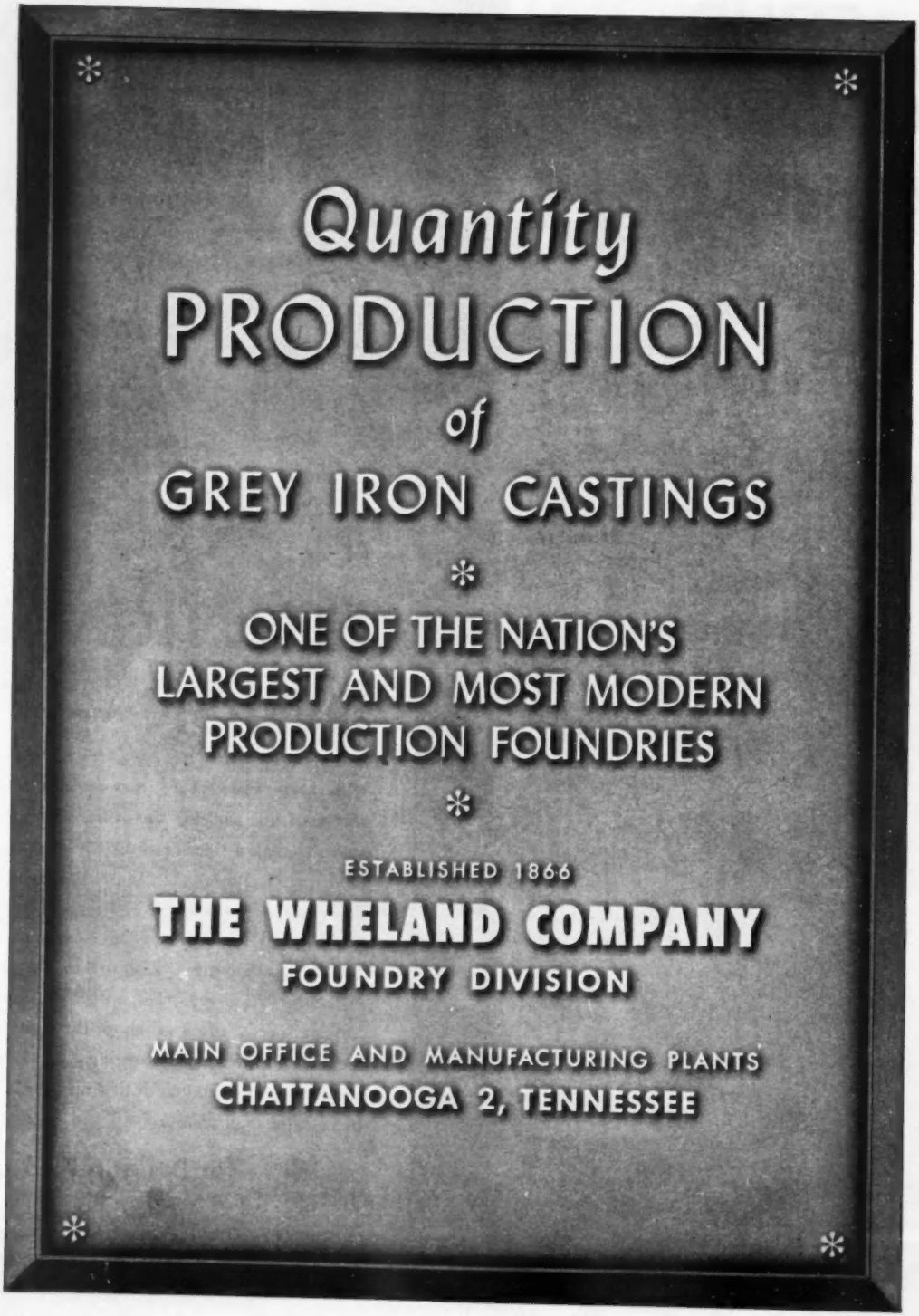
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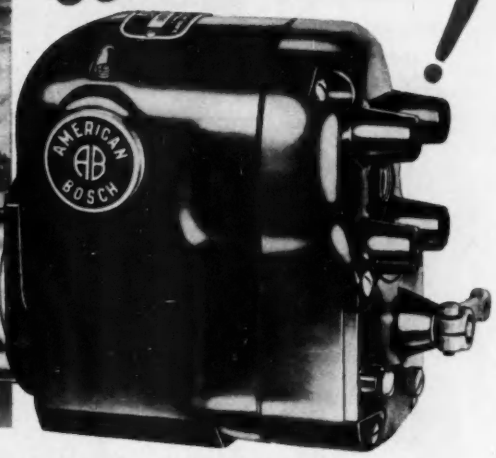
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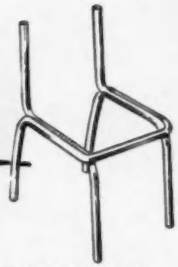


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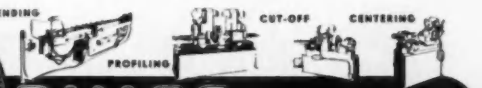
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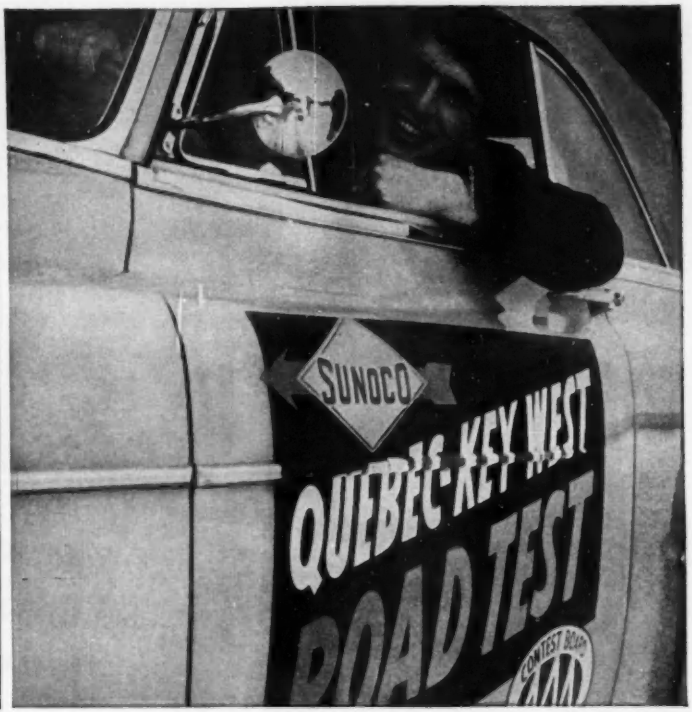
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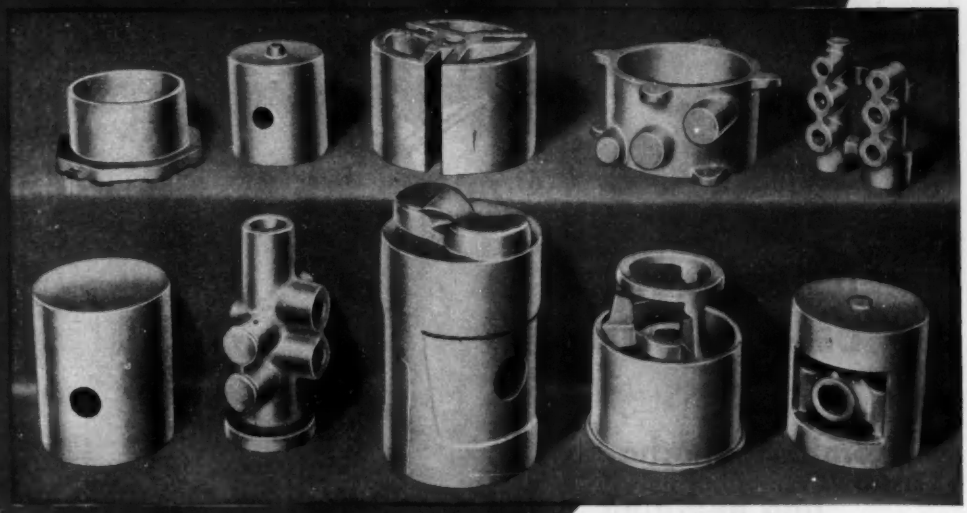
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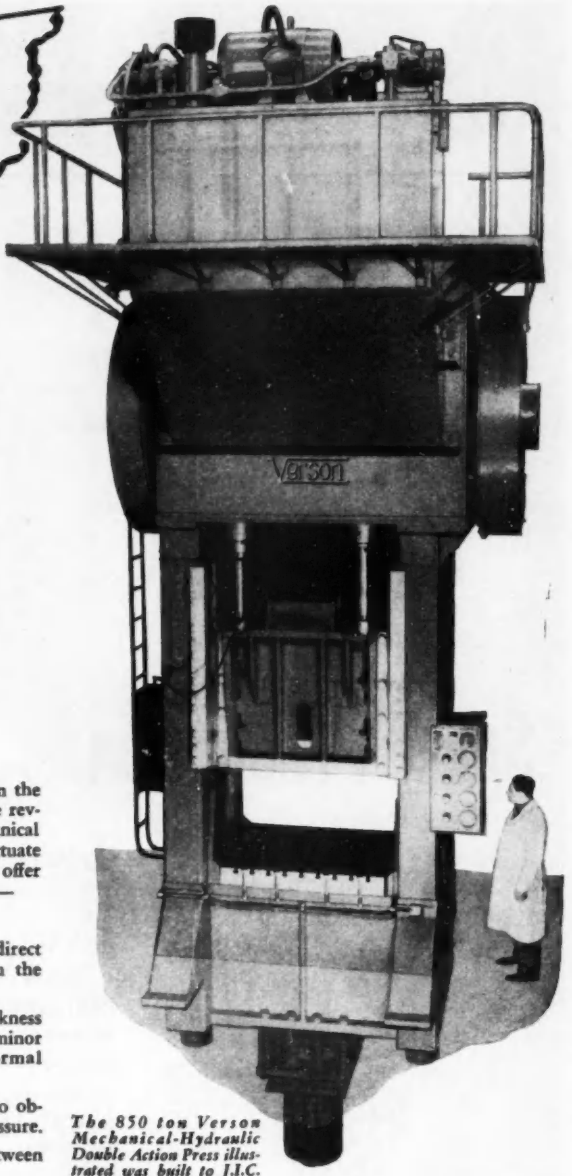
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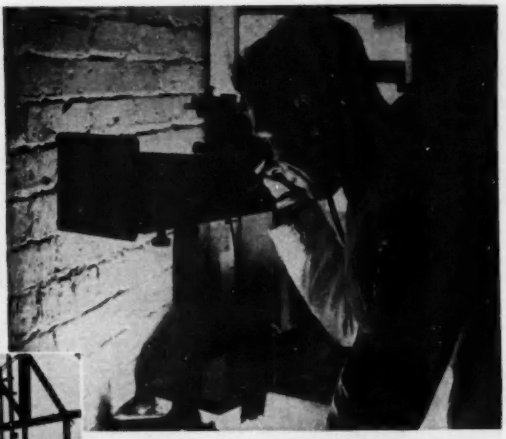
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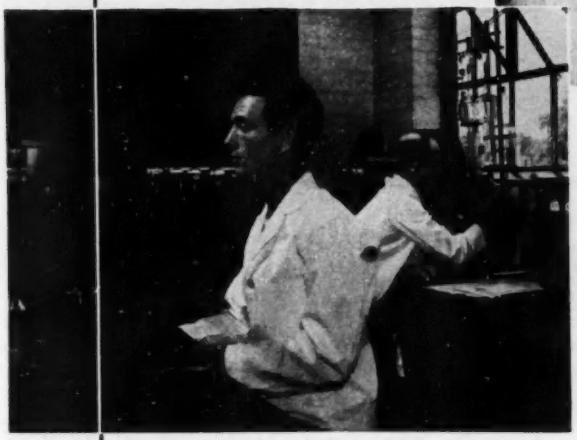
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▲ Shown above is the very important microscopic structural examination which is performed at pre-determined periods four times daily.



◀ Shown at left is another quality control check — weighing sample drillings of iron for carbon determination — just one of several chemical analyses performed to maintain precise composition control.

. . . and how it saves them money. You, too, will be glad, particularly during these times of shortages when quality is often slighted. Centrifugal's quality control means your customers will get more out of your engine — more mileage, more oil economy, more service without breakdowns.

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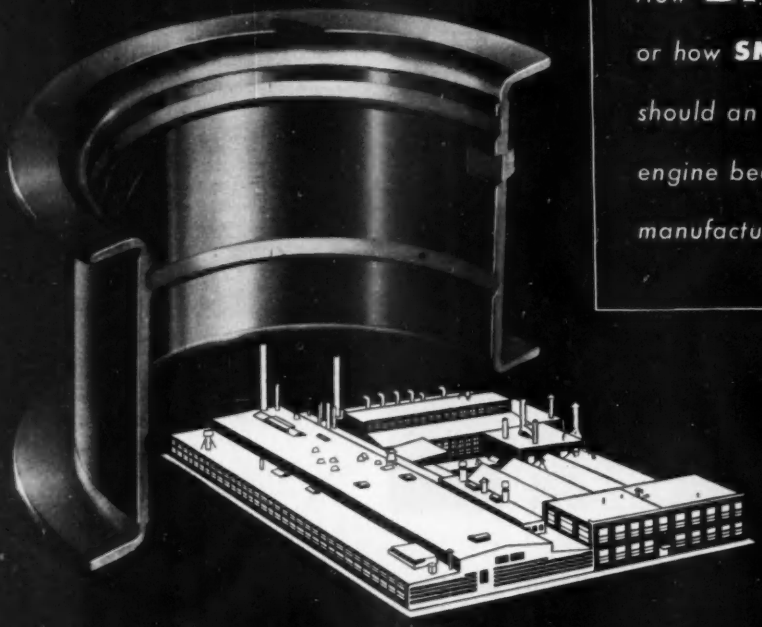
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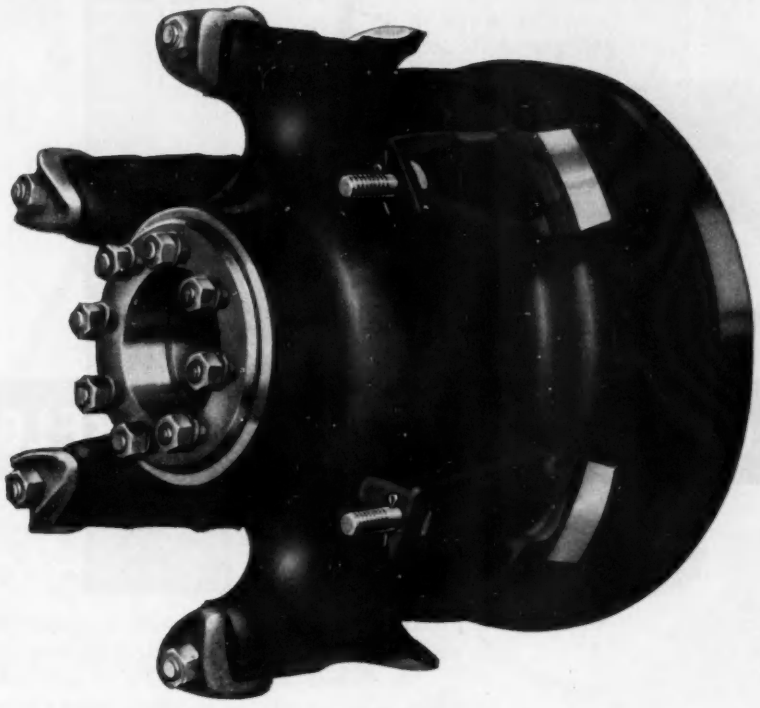
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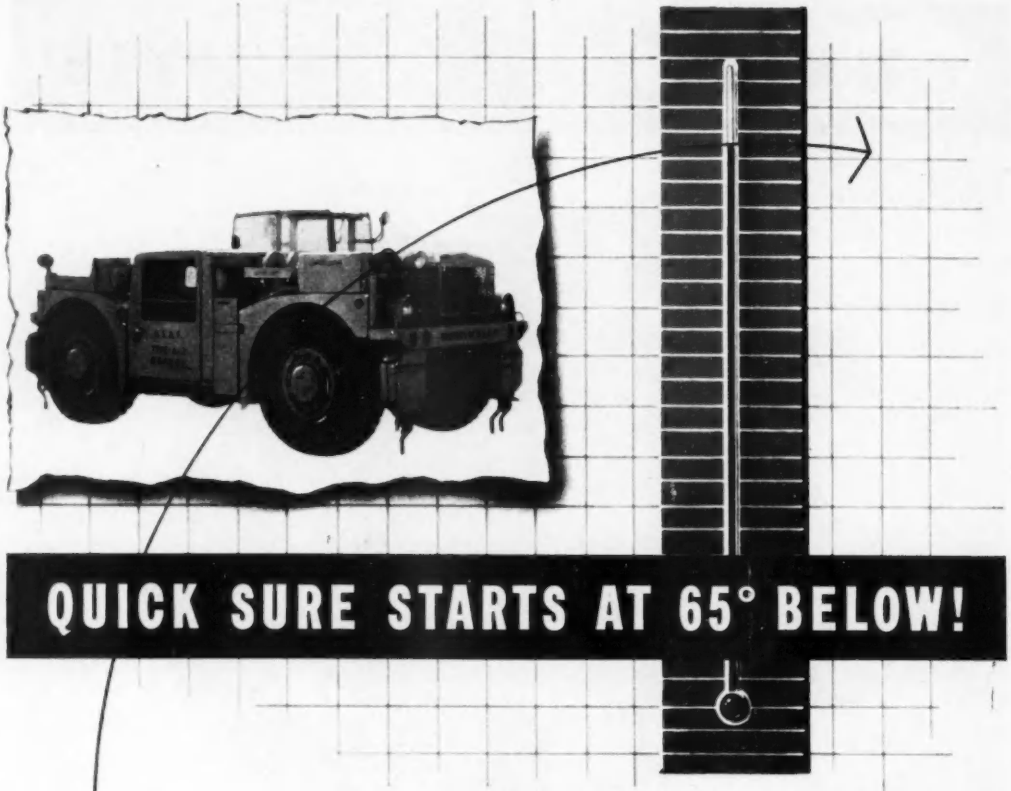
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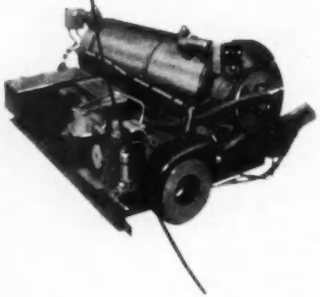
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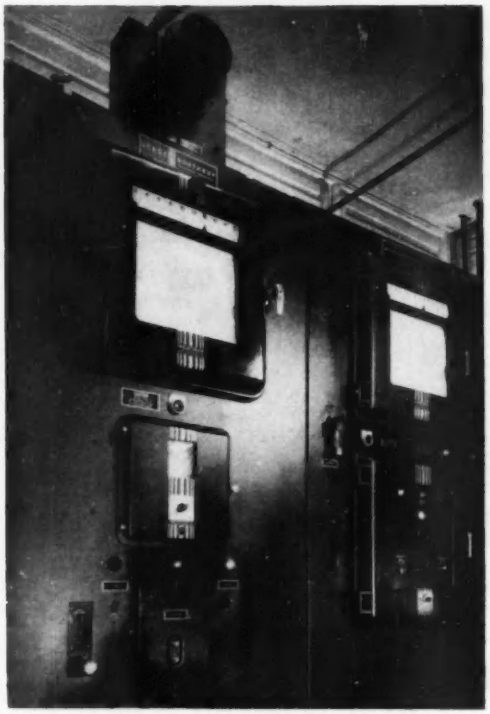
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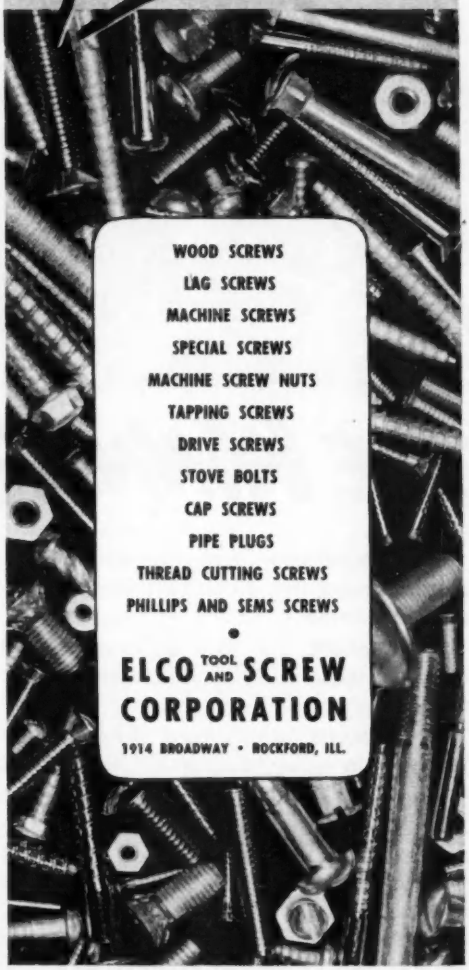
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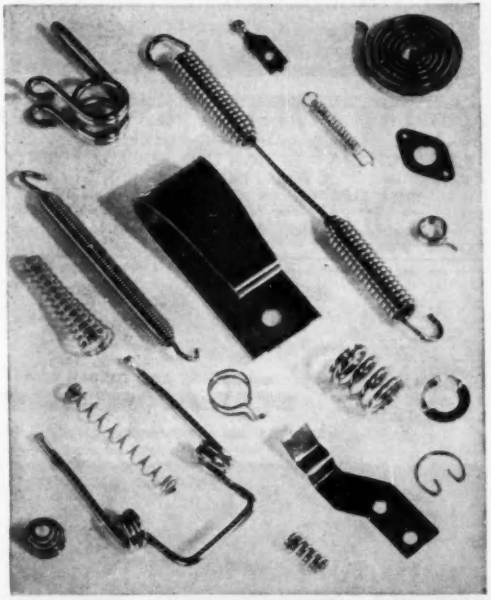


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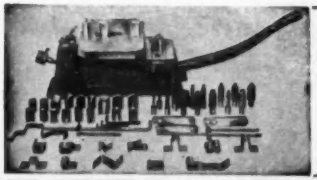
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Index to

The Advertisers' Index is published of the advertising contract. Every rectly. No allowance will be made

AC Spark Plug Div..... 160
Abbott Ball Company, The... —
Acadia Div. Western Felt Works 10
Accurate Bushing Co..... —
Accurate Spring Mfg. Co..... 196
Ace Plastic Co..... 144
Acushnet Process Company... —
Aetna Ball & Roller Bearing Co. 113
Ajax Manufacturing Co., The. 179
Allegheny-Ludlum Steel Corp. —
Allied Products Corp..... —
Aluminum Co. of Amer..... 174
Aluminum Industries, Inc..... 185
American Bosch Corp. 181
American Broach & Machine Co. 172
American Chain & Cable Co. 142
American Chemical Paint Co.. 195
American-Fort Pitt Spring Div., H. K. Porter Company, Inc. ..... —
American Hard Rubber Co... —
Armstrong Cork Co..... —
Arrowhead Rubber Co..... 132
Associated Spring Corp..... —
Automatic Spring Coiling Co.. —
Automatic Steel Products, Inc. —
Automotive Gear Works, Inc. —

Babcock & Wilcox Tube Co., The ..... —
Bacharach Industrial Instrument Co. ..... —
Baird Machine Co., The..... —
Baldwin-Lima-Hamilton Corp. ..... —
Barber-Colman Company....74-75
Barnes Company, W. F. & John ..... —
Barnes Corp., John S..... —
Bauer & Black Div. Kendall Co. 5
Bear Mfg. Co..... —
Bell Aircraft Corp..... 197
Bendix Aviation Corporation
Bendix Products Div..... 14
Eclipse Machine Div..... 91
Scintilla Magneto Div..... —
Stromberg-Elmira Div..... —
Zenith Carburetor Div..... —
Bendix Westinghouse Automotive Air Brake Co..... —
Besly & Co., Chas. H..... 109
Bethlehem Steel Co..... —
Black & Decker Mfg. Co., The 143
Blakeslee & Co., G. S..... 196
Bliss Company, E. W.....96-97
Blood Bros. Machine Co..... —
Bodine Corporation, The..... —
Borg & Beck Div..... 84
Borg-Warner Corp. 177
Bound Brook Oil-Less Bearing Co. ..... —
Brandt, Inc., Chas. T. ..... —
Brown Corp., The..... 100
Buckeye Tools Corp..... —
Builders Steel Supply Co..... 196
Bullard Company, The..... —
Bundy Tubing Company..... 6
Burdett Manufacturing Company ..... —
Burlington Mills, Inc..... 71

C. A. V. Division of Lucas Electric Services, Inc..... —
Cabot, Inc., Samuel..... —
Campbell, Wyant & Cannon Foundry Co. 164
Carboloy Company, Inc..... —
Carborundum Company 26
Centrifugal Foundry Co..... 187
Chambersburg Engineering Co. 169
Chicago Rawhide Mfg. Co.... 148
Chicago Rivet & Machine Co.. 90
Chicago Screw Co., The..... 110
Chicago Wheel & Mfg. Co.... 140
Chilton Co. (Direct Mail).... 98
Cincinnati Cleaning & Finishing Machinery Co., Inc..... —
Cincinnati Milling Machine Co. —
Clark Equipment Co.....103-104
Classified Advertisement 196
Clearing Machine Corp..... 121
Cleveland Container Co., The. 88
Cleveland Punch & Shear Wks. Co., The ..... —
Cleveland Tapping & Machine Co. ..... —
Climax Molybdenum Co..... —
Columbia Steel Company.... —
Columbus Coated Fabrics Corp. 194
Cone Automatic Machine Co.. 12
Continental-Diamond Fibre Co. 127
Continental Motors Corp..... —
Continental Screw Co..... —
Cotta Transmission Co..... —
Crane Packing Co..... 120
Cross Company, The..... —
Cummins Engine Co., Inc..... —

Danly Machine Specialties, Inc. 82-83
Davis & Thompson Co..... 94
Detroit Aluminum & Brass Corp., The 188
Detroit Harvester Company.. —
Direct Mail Div..... 98
Disston & Sons, Inc., Henry.. 193
Dole Valve Co., The..... 72
Donaldson Co., Inc..... 139
Dow Corning Corp..... 159
Dreis & Krump Mfg. Co..... 197
du Pont de Nemours & Co., Inc. 135
Dykem Co., The..... —
Dynamatic Corp Div. Eaton Mfg. Co. ..... —

Eaton Manufacturing Co...156-173
Elastic Stop Nut Corp..... 27
Elco Tool & Screw Corp..... 192
Electric Auto-Lite Co., The... 89
Electric Furnace Co., The.... 146
Electric Storage Battery Co.. —
Ex-Cell-O Corp. ..... —

Fairfield Mfg. Co..... 106
Federal-Mogul Corp. 154
Fellows Gear Shaper Co., The 199
Firestone Steel Products Co... 153
Fitzgerald Mfg. Co., The.... —
Foote-Burt Company, The.... 29
Ford Motor Company (Industrial Engine Dept.)..... 77
Fram Corp. 107
Fuller Manufacturing Co..... 129

G & O Mfg. Co., The..... —
Gabriel Company, The 141
Galland-Henning Mfg. Co..... 4
Garrett Co., Inc., Geo. K..... —
General Controls ..... —
General Electric Co....65-66-67-68
General Radiator Co..... 196
Globe-Union, Inc. 125
Goodrich Chemical Co., B. F.. —
Great American Industries, Inc., Rubatex Div..... 128
Great Lakes Steel Corp..... 79
Greenlee Bros. & Co..... 165
Gries Reproducer Corp. ..... —
Groov-Pin Corp. 142
Gunite Foundries Corp..... 189

H & P Die & Stamping Co.... —
Handy & Harman ..... —
Hannifin Corp. 11
Hanson-Whitney Company .. —
Hartford Steel Ball Co., The.. —
Heald Machine Co., The 2nd Cover
Herbrand Div. Bingham-Herbrand Corp. ..... —
Hill Acme Company, The..... —
Holley Carburetor Co..... 119
Hoof Products Co..... 30
Hoover Ball & Bearing Co.... 92
Houghton & Co., E. F..... 73
Howell Electric Motors Co.... —
Hyatt Bearings Div..... 7
Hy-Pro Tool Co..... —

Illinois Coil Spring Co..... —
Imperial Brass Mfg. Co..... —
Indiana Gear Works..... 192
Ingersoll-Rand Co. ..... —
Inland Manufacturing Div.... —
Inland Steel Company..... 53
International Nickel Co., Inc.. —

Janitrol Surface Combustion Corp. 190
Johnson Bronze Co..... —
Johnson Products, Inc..... —
Justrite Mfg. Co..... 197

Kelsey-Hayes Wheel Co..... 81
Kennedy Car Liner & Bag Co., Inc. 138

Advertisers

as a convenience, and not as part care will be taken to index cor- for errors or failure to insert.

Kent-Owens Machine Co..... 101
Kester Solder Co..... —
King-Seeley Corporation 170
Kropp Forge Company..... 124

Lake Erie Engineering Corp.. —
Lamb Electric Company..... 108
Layne & Bowler, Inc..... —
Leece-Neville Co. 126
Leeds & Northrup Co..... 28
Leland, Inc., G. H..... —
Le Roi Company..... 99
Link-Belt Co..... 167
Lipe-Rollway Corp. 86
Littelfuse, Inc. ..... —
Littell Machine Co., F. J..... —
Long Manufacturing Div..... 149
Lord Manufaturing Co..... 116

McKay Machine Co., The.... 163
Machine Products Co., Inc.... 196
Magnafiux Corp. 176
Magnecord, Inc. 87
Mahon Co., The R. C..... —
Maish Co., Chas. A..... 196
Mallory & Co., Inc., P. R..... 158
Markem Machine Co..... 112
Mattison Machine Works..... 2
Mechanics Universal Joint Div. 162
Michigan Tool Co..... —
Micromatic Hone Corp..... —
Midland Steel Products Co.... 161
Miller Motor Co..... 8
Milsco Manufacturing Co..... —
Minneapolis-Honeywell Regulator Co. 118
Minnesota Mining & Mfg. Co.. —
Mittelmann, Eugene 196
Moline Tool Co. 197
Monarch Machine Tool Co.... 157
Moraine Products Div..... —
Morse Chain Co..... 133
Motch & Merryweather Machinery Co., The..... 150
Murray-Way Corp., The..... 183
Muskegon Piston Ring Co..... 93

N-A-X Alloy Division..... 79
Nadella ..... —
Nash Bros. Company..... —
National Acme Co., The..... —
National Broach & Machine Co. 152
National Machinery Co..... —
National Motor Bearing Co... 175
National Steel Corporation... 79
New Britain Machine Co..... —
New Departure Div..... 24
Niagara Machine & Tool Wks. 114-115

Oakite Products, Inc..... —
Ohio Seamless Tube Co., The.. 123
Osborn Manufacturing Co., The 166

Page Steel & Wire Div., Amer. Chain & Cable Co., Inc..... 142
Palnut Company ..... —
Pangborn Corp. ..... —
Parker Rust Proof Co..... —
Pedrick Piston Rings..... —
Perfect Circle Corp..... —
Perma Products Co., The.... 136
Pesco Products Div. Borg-Warner Corp. 177
Pheoll Manufacturing Co..... 140
Physicists Research Co..... —
Pierce Governor Co., Inc..... 64
Pines Engineering Co., Inc.... 182
Plaskon Div., Libbey-Owens-Ford Glass Co..... —
Polyken Industrial Tape..... 5
Potter & Johnston Co..... —
Pratt & Whitney Div., Niles-Bement-Pond Company 117
Purolator Products, Inc..... 191

Ramsey Corporation ..... —
Rathborne, Hair & Ridgway Box Co. 69
Raybestos-Manhattan, Inc. (Equipment Sales Div.)..... —
Redmond Company, Inc..... —
Reeve Electronics, Inc..... 122
Remont Mfg. Co..... 105
Revere Copper & Brass, Inc... 95
Reynolds Wire Div., National Standard Co. 137
Richards Co., J. A..... 196
Rigidized Metals Corp..... —
Rinshed-Mason Company 178
Rockford Clutch Div..... 62
Ross Gear & Tool Co..... 9
Rubatex Div., Great American Industries, Inc. 128
Russell, Burdsall & Ward Bolt & Nut Co. ..... —
Ryerson & Son, Inc., Joseph T. 16

SKF Industries, Inc..... —
Saginaw Steering Gear Div... 168
Scandinavian Airlines System. 196
Schmieg Industries, Inc..... 70
Schwitzer-Cummins Co. ..... —
Sealed Power Corporation.... 57
Seneca Falls Machine Co..... —
Service Spring Co..... 196
Set Screw & Mfg. Co..... 144
Shakeproof, Inc. ..... —
Shuler Axle Co..... —
Simonds Abrasive Co..... 76
Spicer Mfg. Div. Dana Corp... —
Stalwart Rubber Co., The..... —
Standard Oil Co. (Indiana)... —
Standard Pressed Steel Co.... —
Standard Tube Company..... —
Sterling Aluminum Products, Inc. ..... —
Stewart-Warner Corp. ..... —
Strom Steel Ball Co..... —
Stuart Oil Co., Ltd., D. A..... 80
Sturtevant Co., P. A..... 194
Subscription Post-Card 192
Sun Electric Corp..... 151
Sun Oil Company.....63-184
Sundstrand Machine Tool Co.. —
Superior Steel Corp..... 85
Surface Combustion Corp..... 190
Synchro-Start Products, Inc... 61

Taylor Dynamometer & Machine Co. ..... —
Tennesee Coal, Iron & R.R. Co. —
Texas Company, The..... —
Thompson-Bremer & Co., 3rd Cover
Timken Roller Bearing Co., The .....Back Cover
Tinnerman Products, Inc..... —
Tomkins-Johnson Company, The 102
Torrington Co., The..... 55
Tourek Mfg. Co., J. J..... 3
Towmotor Corp. ..... —
Tung-Sol Lamp Works, Inc... 78
Tuthill Pump Co..... 194
Tuthill Spring Co..... —
Twin Disc Clutch Co..... 145

U. S. Steel Wire Spring Co.... 195
United Engine & Machine Co.. —
United Specialties Company.. 138
United States Rubber Co..... —
United States Steel Corp..... —
Universal Products Co., Inc... —

Vanadium Corp. of Amer..... 147
Vellumoid Co., The..... 197
Verson Allsteel Press Co..... 186
Vickers, Inc. 131
Victor Manufacturing & Gasket Co. 31
Vulcan Rubber Products, Inc.. 130

Wagner Electric Corp..... 111
Waldes-Kohinoor, Inc. ..... —
Waterbury Tool Div..... 155
Waukesha Motor Company... 1
Wean Equipment Corp..... 13
Webb Co., Jervis B..... —
Wellman Bronze & Aluminum Co. ..... —
Western Felt Works 10
Westinghouse Electric Corp.. —
Wheland Company, The..... 180
Wilkening Mfg. Co..... —
Williams & Co., J. H..... —
Wisconsin Motor Corp..... —
Wittek Mfg. Co..... —
Worcester Stamped Metal Co.. 196
Wrought Washer Mfg. Co.... 136
Wyman-Gordon 171

Yale & Towne Mfg. Co., The.. 59
Yates-American Machine Co.. 134
Young Radiator Company... —

Zollner Machine Works..... 200

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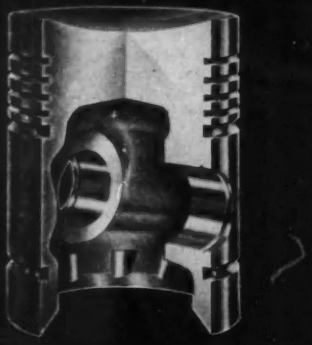


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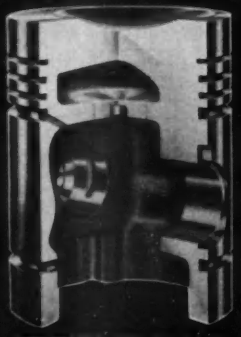
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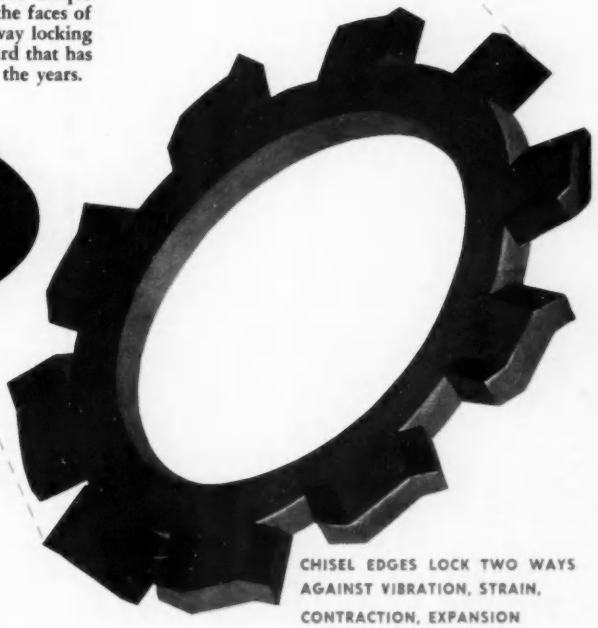
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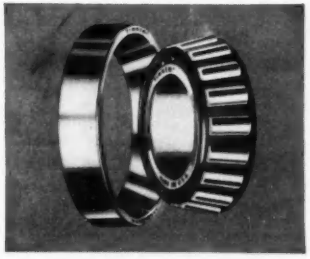
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